THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

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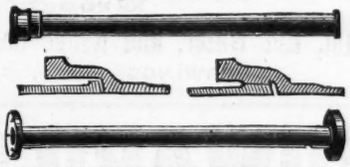

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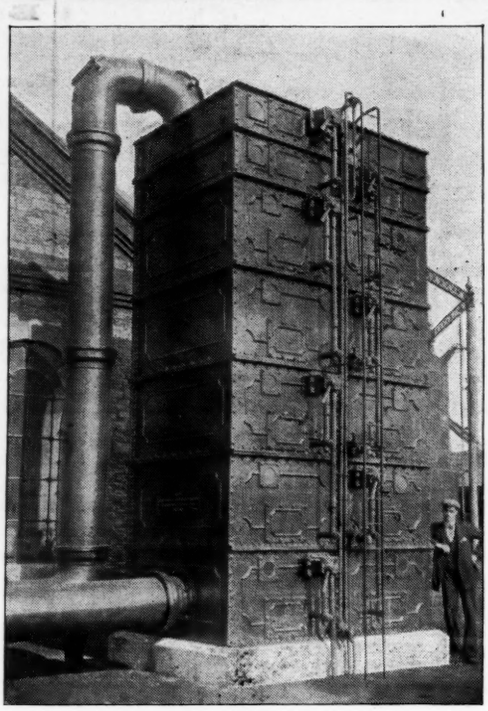

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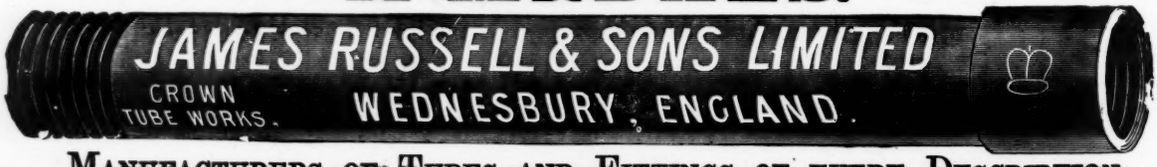

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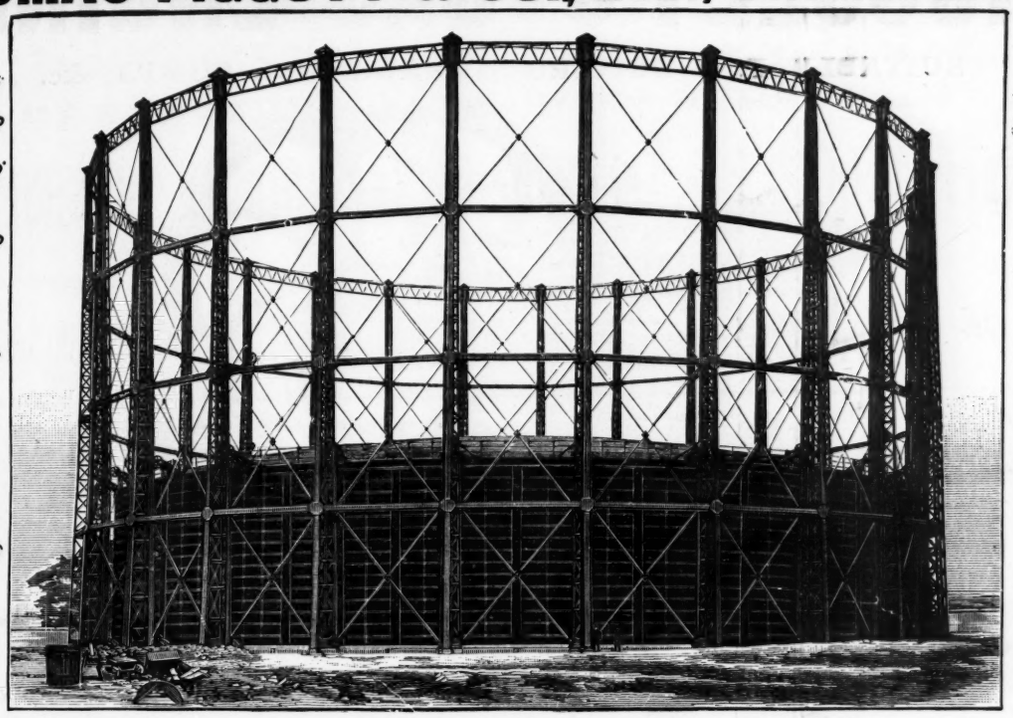

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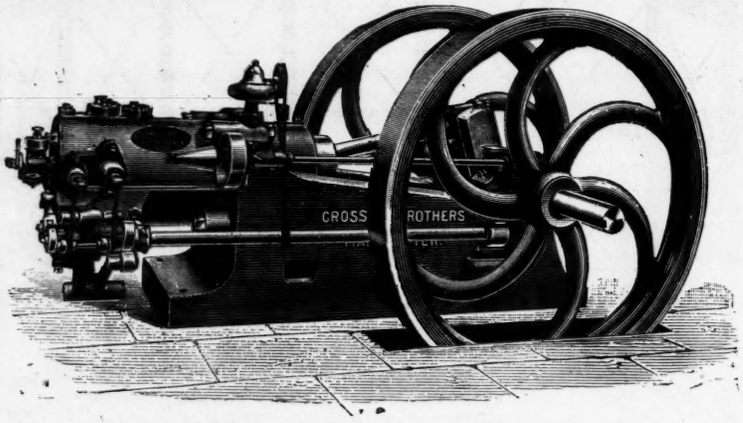

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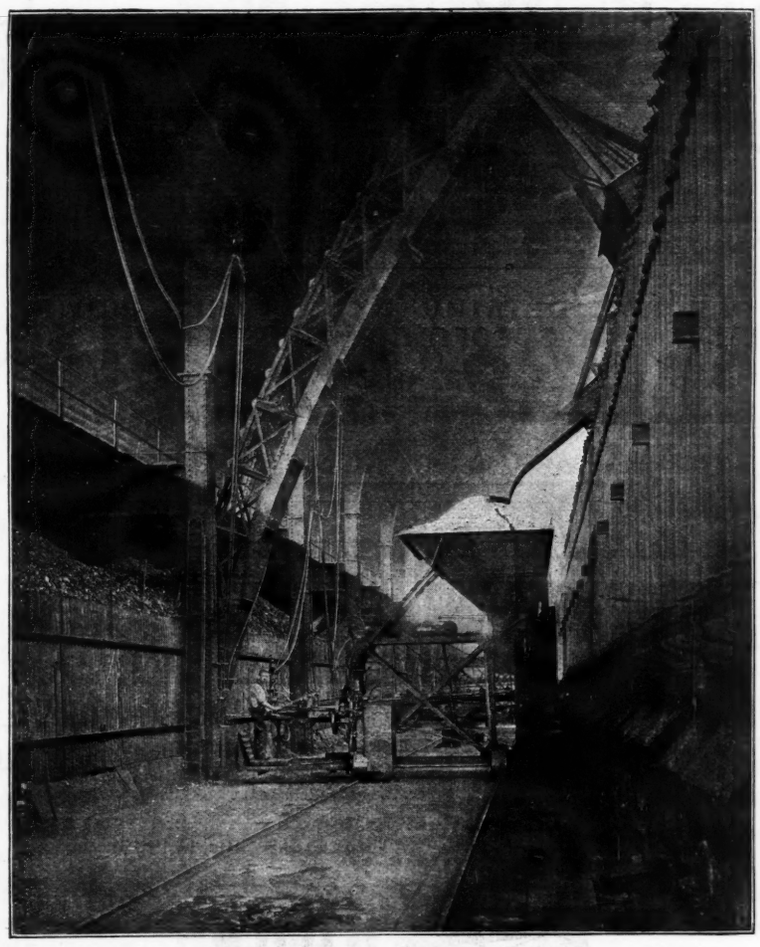

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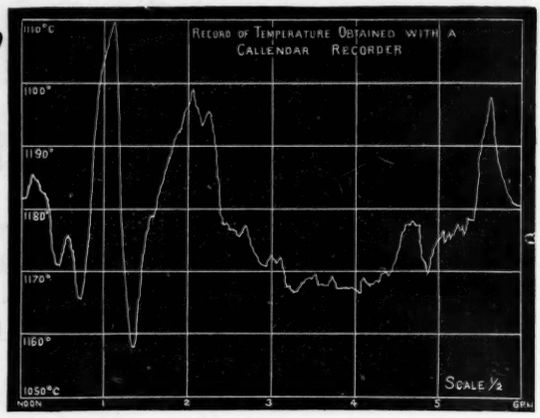

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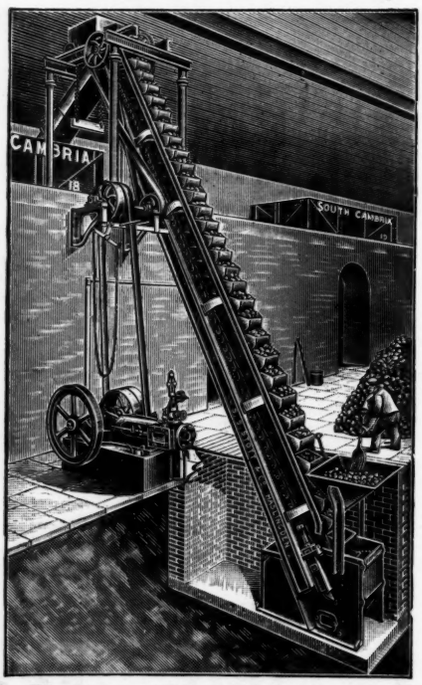

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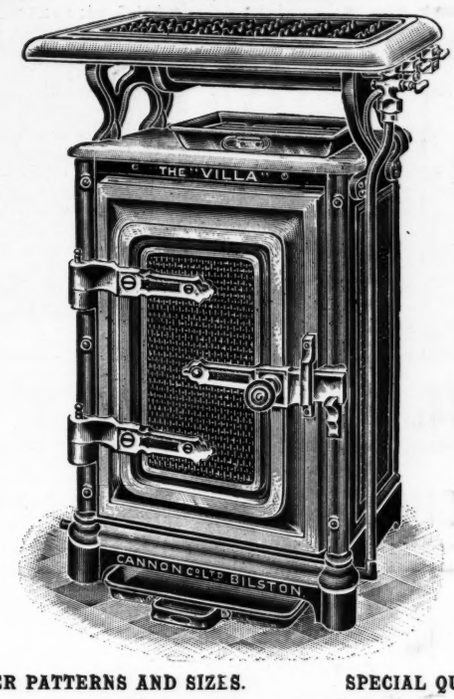

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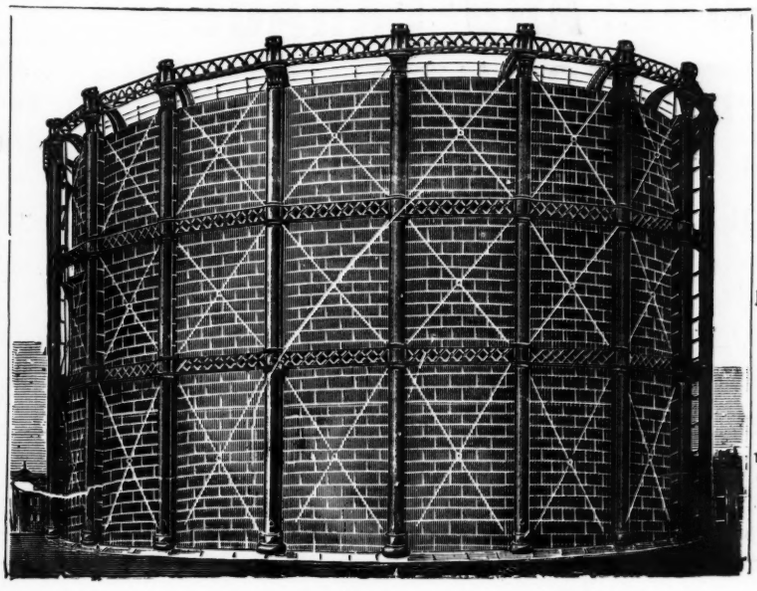

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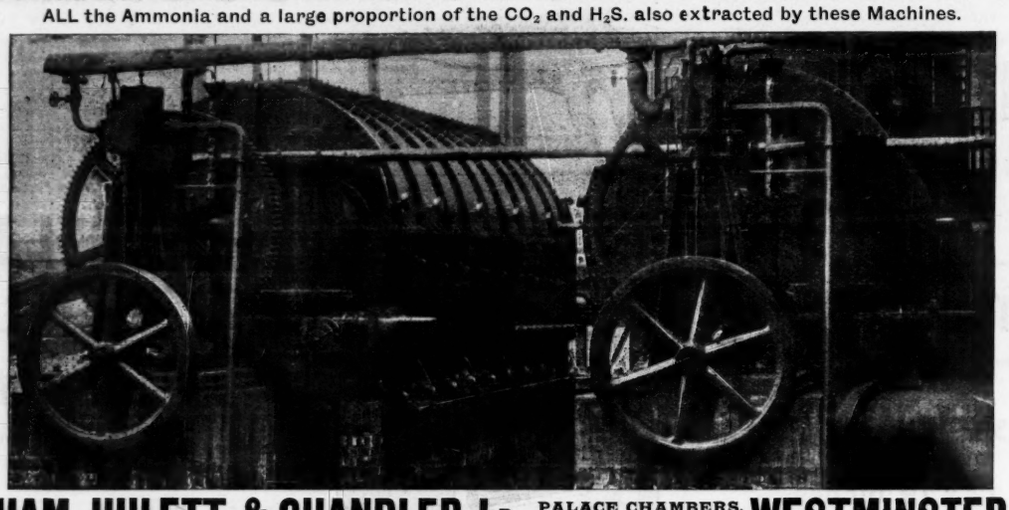

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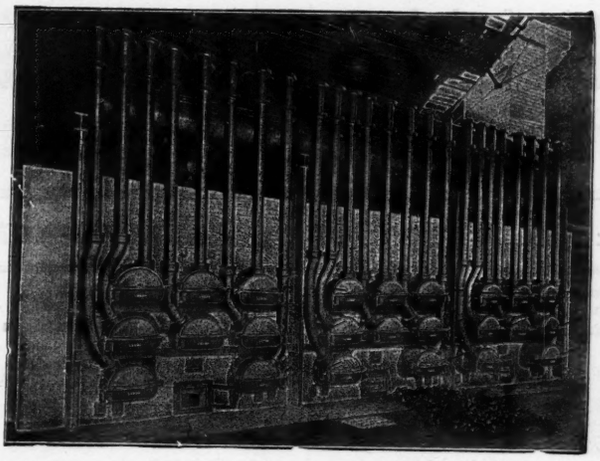

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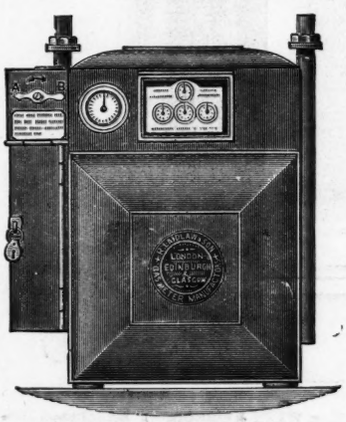

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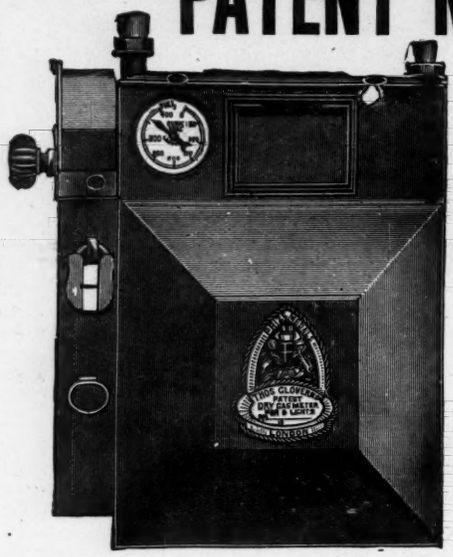

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EDITORIAL NOTES.

Mr. Swan on Gas Power and the Future of British Industry.

THOUGH most of his subject-matter was foreign to our industry, the Presidential Address of Mr. J. W. Swan, F.R.S., to the members of the Society of Chemical Industry in Glasgow, is worthy of the earnest attention of readers of the "JOURNAL," and particularly of those who, as Directors and members of corporation committees, are charged with the superior administration of gas undertakings. Mr. Swan went at considerable length into the subject of electro-chemical industry, with which we have little to do. Even here, however, he touched upon a point—the cost of power generation by various means—which is not a matter of indifference to gas manufacturers. For Mr. Swan admitted that the gas-engine is being qualified to play an increasing part in generating the cheap motive power which is to have electrolytic as well as other applications in this country. He helped to explode the popular delusion that England is necessarily at a disadvantage in comparison with the United States and some other lands, by reason of the lack of large water power within our borders. Engineers, of course, know that what uninstructed people are prone to think of as the free gifts of Nature in the way of motive power—the winds, the waves, and falling water—cost far more to appropriate than they are worth for business purposes. But it is only to be expected that the popular imagination should play round such realized potentialities as the Niagara turbine plant; and Mr. Swan did a useful service to the public in stating the fact that water power may be, and actually is in some cases, more expensive than power obtained from gas or steam.

The reasonable reduction of the cost of motive power obtained from steam or gas is really a far more important matter from the manufacturers' point of view than the exploitation of more Niagaras. This is because steam or gas power is usually made where, as, and for the particular purpose wanted. Niagaras, on the other hand, are not portable. The user of such sources of power must go to them, as they cannot be brought to him. The utilization of these large natural sources of power has shown, so far as the process has already gone, that there are few industries in which power is the chief consideration. It is usually preferable to bring the power to the raw material, instead of carrying the raw material to the power. On the other hand, the cheapening of power where it is required is a point of economy like another; and every manufacturer will readily "scrap" an old engine for a new one capable of doing the same work at a sufficient saving of fuel.

This is where the modern gas-engine comes in; and the fact that gas power is recognized for the cheapest that can be made from fuel, is enormously in its favour. Yet it cannot be gainsaid that the progress of gas power in the esteem of manufacturers has not been uniform. On the contrary, it has had its ebbs as well as its floods, as various considerations affecting it have struck the industrial fancy of the hour and place. Still, on the whole, the gas-engine has gained year by year, until now it seems proved that there are actually gas-engines of large size at work, competing with steam-engines of high power. Mr. Swan spoke of the 1000-horse power gas-engines in existence on the Continent, using blast-furnace gas. Of course, the lack of such specimens of mechanical engineering in the United Kingdom is interpreted by commentators as reflecting on the enterprise of the British ironmaster. A contemporary hopes that Mr. Swan's remarks on this subject may be read by those responsible for the prosperity of our iron and steel industries, and trusts to have the pleasure at an early date of giving details of the first large gas-engine driven by blast-furnace gases in this country.

This desire is likely to be gratified before long. But, meantime, let us remark that the proved possibility of making large gas-engines, which the world owes to the enterprise of the French and Germans, does not carry with it the corollary that therefore these large gas-engines are peculiarly advantageous things to have about a works. Assuming that the service of a battery of blast-furnaces demands one blowing engine of 1000-horse power, what is to be done with all the rest? It strikes one very forcibly that the too-big gas-engine is more likely to be a white elephant than a useful servant. The adaptability of the gas-engine to the economical distribution of power, rather than its concentration, is its chief recommendation. The really imperative need for the employment in industrial operations of very large prime movers, is restricted. Where the power is to be distributed by means of shafting, or even to some extent electrically, it is cheaper to have a number of gas-engines dotted about near their work. This is where the gas-engine beats the steam-engine hollow. It sounds very fine to hear of a Sulzer or other grand make of steam-engine, of 1000-horse power or thereabouts, working at a steam consumption of 12 lbs. per indicated horse power per hour. But at what cost for incidentals is this high duty attained? Steam-boilers at 250 lbs. pressure; costly economizers; superheaters; a high-class driver; and the perpetual fears of the works manager that something may go wrong. And all this for what? For the saving of a trifle of coal, which is not dear. Moreover, to use such large power units, there must be a considerable amount of gearing or belting, which absorbs far more than the engine saves.

The gas-engine does away with all this. A 30-horse power engine is as economical as a 300-horse power engine, or thereby; and it is far handier. The shafting can be cut down to a minimum; and there is no loss in the gas-pipes that convey the source of energy all over the premises. Compare this style of power distribution in a factory with the old-fashioned big steam-engine and miles of shafting and belting, or with the new-fangled electricity, and it will not be found wanting. The works manager, moreover, knows that nothing can go wrong; and he can tell precisely what his power is costing him, which is not always possible with other systems. In so far as the big gas-engine serves as an advertisement of the moderate-sized motor of the same species, it is admirable as an object-lesson. For itself, however, we expect only a limited demand. It should be remembered, also, that gas-engines of a size that compels the user to manufacture the gas for them—supposing waste gas, such as that from blast-furnaces, to be unavailable—are apt to be troublesome on this score. We do not undervalue the many and various power-gas producers, from Dowson's to Duff's, which are in the market. They are excellent pieces of apparatus, capable of beating both the steam-boiler and the ordinary gas supply in the matter of cost. But cost of the gas is not everything, and may even be misleading. Blast-furnace gas seems, at the first blush, to be a gratis article where it exists at all; but this is far from being the case. Expensive arrangements must be made for catching it; and it requires a good deal of more expensive purification before it is fit for use in that other costly thing, the cylinder of a gas-engine. Indeed, those who have the widest experience of the manufacture of power gas contend that, unless this is the product of the best and cleanest Welsh anthracite, it must be purified exactly like the gas which results from the carbonization of coal in retorts.

It is plain that every power user cannot rely upon always having a supply of the proper kind of anthracite at hand for making his gas; and still fewer would care to be troubled with all the purifying processes of a gas-works. Here is the opportunity for the gas-engine consuming ordinary gas; and we are strongly of opinion that, if the practice of gas-works administrators were radically altered in this regard, and they put power gas at the disposal of their public at half the price of lighting gas—as for daylight and regular consumption they could well afford to do—the moderate power gas-engine would spread like wildfire, to the general advantage. If there is another side to this suggestion, we should like to be told of it. One other remark of Mr. Swan may be cited here. He said the great need of the present age in manufacturing and industrial England is properly educated men at the head of affairs. For want of this adequate scientific and technical education, British employers are frequently unable to grasp the bearings of such counsels as are addressed to them by their advisers; and

thus they fail to meet the emergencies of a highly competitive and progressive time. That is, unquestionably, true of the heads of many of our British industries. We give the children in elementary schools a smattering of information, which does not amount to much, but is perhaps good so far as it goes. We omit to see that those who must have the last word in regard to the conduct of industrial operations are competent in proportion to their responsibility. There is the national weakness, for which we are paying dearly already, and for which we shall suffer more severely yet, if we do not cure it.

Mutual Schemes under the Workmen's Compensation Act.

ELSEWHERE will be found some particulars, taken from the annual report of the Registrar of Friendly Societies—Mr. E. W. Brabrook—as to the working of the several mutual schemes under the Workmen's Compensation Act which have been certified by him. The adoption of this method of dealing with claims—or rather, we should say, of discharging the employer's liability under the Act (for it is one of the advantages possessed by many schemes that compensation for all accidents is provided automatically, and does not form the ground of "claims")—makes but slow progress. Only two fresh schemes were certified during 1900; the number previously sanctioned being 46; the total number of men who had consented thereto being, on June 30, 1900—the end of the report year—123,289. The South Metropolitan Gas Company still provide the solitary example of a gas undertaking adopting a scheme. In the case of three out of every four schemes, the total number of men employed have become consenting parties; the South Metropolitan Company being among the majority in this respect.

This slow progress in the adoption of mutual agreements, in lieu of the exact provisions of the Act, is disappointing to those who hold, with us, that the balance of advantage is decidedly with the mutual scheme. It may not be superfluous to recapitulate some of the reasons upon which this opinion is based. There are three ways in which the liabilities imposed upon an employer by the Workmen's Compensation Act may be discharged: (1) By the payment direct to the injured workman or his dependants of compensation in accordance with the second schedule to the Act, upon the workman or his dependants making and establishing a claim to such compensation; (2) by paying a premium to an insurance company, who undertake to discharge all established claims to compensation; or (3) by adopting a mutual scheme, whereby the workmen in the employment receive from the employer benefits "not less "favourable" to them than the provisions of the Act.

If either of the first two of these three methods is adopted, the risk of vexatious litigation is incurred—claims, in themselves insignificant, being frequently contested as a matter of principle; while other entirely unjustified claims, made at the instance of Trade Union lawyers, have to be defeated at very considerable expense. Such actions do not promote good feeling between master and man—tending only to the advancement of Trade Unionism. Against the system of merely paying established claims when incurred, the further objection may be urged that the annual cost is then always an uncertain item. In the case of a small undertaking especially, a fatality involving the death of (say) half-a-dozen workmen—and such a thing, though happily extremely rare in the gas industry, is quite possible—might seriously affect the finances of the concern for the time being. Against the system of covering risks by insurance, two very strong arguments may be brought forward. The first is that insurance companies work, not at a loss, but at a profit. Insurance, therefore, means a greater cost to an industry than paying its own claims. Mutual insurance is the only method that can be defended. The second is that insurance companies may cause considerable friction between the employer and his men by dilatoriness in awarding compensation, or by disputing claims on grounds of which an employer would not avail himself. In some of the mining districts especially, complaints have been loud as to delay on the part of insurance companies in settling claims.

None of these objections can be urged against the establishment of a scheme, agreed to by both the employer and employed, whereby compensation is awarded automatically, without contention (or, if any dispute arises, on the decision of a joint committee, or a committee of men only), and, in the majority of cases, immediately. It is a feature of almost every scheme certified that compensation is paid from the date of the accident instead of from a date fourteen days thereafter, as provided by the Act. Under such schemes, employers know definitely the extent of their liabilities, and—most important of all—are provided with a means of maintaining and promoting amicable relations with their workmen. Where provident societies already exist in connection with works, they form a most convenient basis for a scheme under section 3 of the Act. Where no such societies exist, the adoption of a scheme furnishes an excellent opportunity for their institution; and it is hardly necessary to say we regard provident societies—established on right lines, and managed with care and intelligence—as invaluable instruments for promoting good-fellowship on a works.

No stronger argument could, perhaps, be urged in favour of these mutual schemes than the fact that they, in common with works provident societies, are looked upon with the greatest disfavour by Trade Union advocates. They "promote a vertical cleavage" (presumably between workmen who join them and those who do not) "which interferes with "Trade Unionism." So says the Secretary to the Women's Trade Union League. Mr. John Burns, M.P., condemns them on the ground that they "prevent men from joining "Trade Unions." And so forth. A provident society, a profit-sharing system, and a mutual scheme, together form a weapon well fitted for smiting Trade Unionism hip and thigh, to the everlasting benefit of all concerned. Unfortunately, the men strong enough, or wise enough, or energetic enough, to forge such a weapon for themselves are but few and far between.

Meeting of the Gaslight and Coke Company.

ANOTHER Half-Yearly Ordinary General Meeting of the Gaslight and Coke Company has been held; and matters remain precisely where they were with the largest gas undertaking in the world, for the administration of which nobody has a good word, and which Parliament would not trust with another shilling of capital. The meeting, which was a small one, ended with the usual vote of thanks to the Directors for their able conduct of the affairs of the Company. There are, as everybody outside the Horseferry Road recognizes (and some inside it), several separate and distinct recent performances to the credit of the Board, for which these thanks are specially deserved. The first is the wise and conciliatory language in which the Governor (Colonel Makins) hailed the results of the labours of Sir James Rankin's Committee, which naturally predisposed the Metropolitan Local Authorities and likewise Parliament in favour of the Board. The second is the drafting of the Company's two Bills, which would doubtless have passed if Parliament had not unfortunately misunderstood them. The third is the devotion of this Board of wealthy men (the Governor owns to representing £100,000 of ordinary stock), who allowed the last issue of stock to fail, and the value of the whole to drop to a discount, rather than take a parcel of £38,000 among themselves. The fourth is the cleverness with which this Board, guided by lawyers, committed the meeting to an illegal expedient for persuading the recipients of dividend to pay some financier for repairing their *laches*. Last Friday's performance in this regard was certainly one of the most undignified that ever marred the record of an English gas company.

This Chartered Board is hopeless. There can be no question about that. Six months ago, the Governor was bowled over by a question put by a lady shareholder as to the wisdom of increasing the capital of an undertaking so terribly over-capitalized. Now, by way of justifying the action of Parliament in refusing this increase of capital, the Board have published accounts showing that they can get along with scarcely any fresh capital expenditure at all. This is a remarkable way of preparing for another application to Parliament for a million—to last five years! Of course, every meter and stove maker on the Company's books, and every tradesman who has laid himself out to do the Company's district work, knows that the whole business has been shut down, as regards extensions. But there it stands in black and white—the Company do not want any more money! As Mr. Livesey remarked on Friday, this is no time for fault-finding or picking holes here and there in the detail work of the undertaking. It is the Board which is all wrong. The Governor, after having professed (too late) his desire to fall in with the recommendations of Sir James Rankin's Committee, turned his back upon the whole preamble by falling foul of the chief recommendation of this Committee, which it is open to be doubted if he ever really

understood. Lastly, after all had been said, Colonel Makins gratuitously showed that his inner convictions as to the principle of managing the undertaking of the Company had not changed, by dropping into the old optimistic declaration that they could always keep out of the Bankruptcy Court while they could get another £90,000 a year of revenue by putting up the price a penny! What is the use of talking about anything else while this principle remains the Golden Rule of the Horseferry Road Administration?

The Responsibility of Trade Unions—Official History of the Cork Strikes.

An entirely satisfactory answer was given by the Leader of the House of Commons on Thursday last to the inquiry of Mr. Keir Hardie as to whether the Government proposed to initiate legislation to restore to the funds of Trade Unions the protection which the judgment of the House of Lords in the Taff Vale Railway case (referred to last week) had taken away. Mr. Balfour stated that the Government did not propose to introduce legislation; thus leaving the law as it stands. It is easy to imagine what a to-do there will be at the autumn meetings of Trade Unionists over this terrible decision, at which, nevertheless, a good many well-wishers of rational Trade Unionism are openly rejoicing, since it will tend to put the Sim Tappertits in their proper place.

While dealing with this subject of the financial responsibility of Trade Unions for the acts and defaults of their executive, we desire to acknowledge the receipt from the Directors of the Cork Gas Company of an official statement giving the full history of the strikes at their works during February and May. The text of this document will be found in another column. It was high time that the truth about these disputes was fully told; and we congratulate the Directors and their Manager (Mr. Magrath) upon the good account they are able to give of their position throughout these trying experiences. The root of the whole trouble lay in the disaffection of the men, who had two masters; and it ended in the inevitable way. The first outbreak, in February, started in the taking of French leave by three stokers. When next morning these very free and independent citizens were requested to report themselves to the Manager before resuming their work, not only did they fail to do so, but all the others threw down their tools and departed. This was followed by the usual deputation to the Directors, when the men raised all sorts of grievances, and their spokesman advanced numerous statements, while completely ignoring the particular misconduct which caused all the trouble. Not one of these complaints had ever been brought under the notice of the Manager or the Directors; nor did they bear in the smallest degree upon the strike. Nevertheless, the whole of these statements were looked into, and they are disposed of in detail. It was the first instance of a strike at the gas-works, and the Directors were extra-desirous of meeting the men indulgently.

Unhappily, this generosity on the part of the Board and the management had not the desired result. The men had tasted blood, and the work was seriously disorganized. The evil was never after eradicated, but culminated in May in a deliberate refusal by four stokers to obey the Manager's orders as to charging some retorts. Within an hour, all the men struck; and the Secretary of the men's Society, upon being sent for by the Secretary of the Company, refused to go, saying it was the Secretary's business to come to him. Mr. O'Mahony then went to the stokers' lobby, and tried to bring the men to reason. Mr. Harrington, a Director, having arrived at the works, also tried to bring the men to their senses; pointing out the serious consequences which their conduct might cause to the public. He reminded them of their promise, made after the previous disturbance, never to strike again without giving proper notice, and submitting to the Directors any grievance they might have, so that it could be dealt with. In vain. The men went out, including the carters; and then followed the heroic struggle against enormous difficulties of Mr. Magrath and his devoted staff, which, though in the main victorious, is not even yet completely over. The strikers and their outside sympathizers, some of whom are in the Corporation, used every means to prevent the Company from carrying on the manufacture of gas. The destruction of the gasholder is to be the subject of litigation, and therefore cannot be discussed. Now, after all their declarations about the sacred duty of resisting the encroachments of Capital, and so forth, the men would be only too glad to get back to work again on the old terms. Their politicians have probably not contributed very largely to their support. Though the coke-carts from the works have still to be sent out under police protection, and the new hands are exposed to insult and intimidation, the Directors profess their willingness to take back some of their old workmen whom they believe to have been led astray by the factious minority. But, of course, the Company cannot break faith with the men who came to them in their hour of need, on promise of permanent employment. This is how the matter now stands; and the Directors confidently appeal to the consumers for sympathy and support in their conduct of affairs under very exceptional difficulties, which, as they truly say, were not in any way of their own creation.

The Sale of Coke.

The statement by Mr. Livesey, at the half-yearly meeting of the Gaslight and Coke Company last Friday, that the South Metropolitan Company were concluding contracts for the sale of their coke, over the twelve months commencing in October next, at 12s. 6d. per ton, may be said to fix the maximum contract price now obtainable. It is unfortunate for the former Company that the market did not respond to their offer to take 14s. per ton—or perhaps we should say that the Company did not better gauge the market before inviting tenders—for they must now, of necessity, be second instead of first in the field, and the advantages accruing to the early bird are proverbial. The experience of this year may, indeed, lead to a reconsideration of the policy of selling coke by tender, the consequences of failure to attract buyers being so very undesirable. It is certain that a reversion to the Company's former policy of sale by private treaty—which requires for its successful pursuit the control of an astute and well-informed "man of the (commercial) world"—would be welcomed by the coke market, not because buyers would then obtain coke at lower prices, but because they would "know where they were."

As it is, the system of tendering has a very disorganizing effect—with no compensating advantage to the seller—by its encouragement of speculation. A and B tender for 20,000 tons each; A wants that quantity to use, B (who is without capital) wants it to sell again. Supposing the demand is good, and the total quantity offered by the seller is applied for twice over. Then A and B are each allotted 10,000 tons, and B later on sells his quantity to A at a profit which the seller would probably have secured for himself if he had gone quietly to work. This, however, is a small matter compared with what may occur if, before A wants the second 10,000 tons, the market droops considerably. B is indisposed to sell at a loss the 10,000 tons he has undertaken to buy, and thinks he will wait for a rise. A buys his requirements elsewhere, and the market then falls lower still. B is quite unable to face the loss involved in paying contract, and receiving market, price, and fails to fulfil his obligations. The seller has then to dispose in a poor market of what he might have sold to a genuine consumer at a good price; further damages the market by so doing, making it more difficult than ever for the middlemen to sell what they have bought; and, finally, finds it altogether unprofitable to sue B for his failure to fulfil his contract, because B is not worth powder and shot. This appears to us to be a very real danger involved in the tender system, which could only be avoided by a discriminating allotment; and that always opens the door to discontent, imputations of favouritism, undue influence, and so forth.

Another way in which "tendering" must disorganize the market is this: Supposing the same case as before—A obtaining one-half of his supplies direct from the maker, the other half from a middleman at a higher price. Next year A thinks he will get all he wants at the price named in the tender forms, so he tenders for 40,000 tons when he only wants 20,000 tons. But it then happens that only the total quantity offered, or less, is tendered for; and A finds himself saddled with twice his requirements, and has to dispose of 20,000 tons in the market, very likely at a loss. The seller has done well for the moment, doubtless; but he has made an enemy of A, who says to himself: "Never "again, if I can help it."

These imaginary instances are not far removed, we believe, from actual occurrences; but if anyone wants more explicit information as to the irritating effect of the disorganizing consequences of the tendering system upon buyers, and upon other producers of coke alike, let him go on the Coal Exchange and ask for a few remarks upon the subject, or bring the matter up for private discussion at any meeting

of gas managers either in the South of England or the Midlands. What he hears will at least have the merit of being expressed in picturesque language.

Smoke Prevention Again.

HERE and there, now and again, prosecutions of factory owners under the Smoke Prevention Acts occur, and are variously disposed of. A typical case of the kind is reported from Hammersmith, where the apostle of the new movement for the purification of the atmosphere, Sir W. B. Richmond, took renewed proceedings against a manufacturing firm who had had an order issued against them in 1898. These cases are truly tragic, for there is a large proportion of right on both sides. If there is an element of persecution in the acts of those who make it their business to attack the proprietors of chimneys which occasionally smoke, on the other hand it must be allowed that there is a good deal of British stubbornness and ignorance on the side of many factory owners. These are the yielding quantities which the Magistrates have to reckon with in endeavouring to deal justly with the cases brought before them. It is a hardship for well-meaning factory owners to be persecuted at the instigation of busybodies who seek notoriety at least as ardently as they desire pure air. Still, there is no reason why a neighbourhood should suffer from smoke pollution of the atmosphere, merely because the perpetrators of the mischief are too selfish or too obstinate to put themselves out somewhat for the public good. If the world were governed by reason, it might be presumed, in the generality of cases, that those who are engaged in manufacturing operations are competent judges of the methods required to be employed in their works; but this hypothesis is inadmissible under actual conditions. A manufacturer who requires a little power, for example, may be quite incurious as to the possibility of obtaining it with the best advantage to himself, and without annoying his neighbours. The same old boiler and engine that were on the premises when he took them over are good enough for him, though a gas-engine might be better.

The worst offenders, usually, in populous places are the central stations for electric lighting, with their water-tube boilers. Several of the Metropolitan Companies have been smartly fined of late for this transgression. Yet it is easy to see why they offend. The water-tube boiler possesses the great practical advantages of making a lot of steam for the ground it occupies, and of bearing to be forced. These benefits are precisely what a town power station wants. Against them must be set the large fuel consumption of this type of boiler. To repair this drawback, there is a strong temptation to burn cheap and dirty coal. The risk of fines is therefore deliberately run. It looks in some cases as if the owners of these plants had elected to pay the fines rather than obey the orders of the Court. This policy, however, is hazardous. The English law has a way of making itself respected in the long run, as transgressors usually learn. Where boiler-fires have to be forced occasionally, the use of the very best Welsh smokeless coal is the only means of escape from unpleasant legal pains and penalties; and if it proves expensive—those who subject themselves to such exigencies must bear the cost. It is certainly not right to transfer to the innocent neighbourhood all the inconveniences of carrying on a business.

WATER AFFAIRS.

The Control of the London Water Supply.

THE Bill introduced by Sir J. Blundell Maple, on the 23rd ult., "to vest the undertakings of the London Water Com-"panies in a single public authority, and for other purposes," was published by His Majesty's Printers on Tuesday, and a full summary of its provisions, the nature of which was indicated in the "JOURNAL" last week, will be found in another column. A perusal of the text of the Bill has failed to remove an impression which forced itself upon us when the announcement was made that the honourable baronet was engaged upon a scheme for settling the London Water Question, that he would not be more successful than his predecessors in solving the very difficult problem which he had taken up. It may be that he has produced a better scheme than the one which the Local Government Board has outlined, if it has not been already drafted, in fulfilment of the promise made that there should be legislation on this subject next session. Of that nothing can, of course, be said until the views of the Department have been made known. In the meantime, the public—or rather, we should say, the small section thereof who really take an interest in this matter—have before them a definite proposal emanating from a private Member of Parliament; and even if it should be overshadowed by the Government Bill when it appears, it will still be evidence of a desire to arrive at a settlement of what is really a stupendous question. For when a subject has been investigated by two Royal Commissions within a decade, one feels almost inclined to regard it as of sufficient importance to take rank among Imperial matters. As the proposals contained in Sir Blundell Maple's Bill were so fully dealt with last week, it may be of interest, and possibly profitable, to glance for a moment at the two preceding suggestions for the constitution of a Water Authority for London.

Rather more than five years ago, it will be remembered, Lord James of Hereford introduced, for the Government, a Bill "for the better control and regulation of the water "supply of the Metropolis and the surrounding districts." It was proposed to establish a Water Board composed of thirty members, sixteen of whom were to be appointed by the London County Council, two each by the Common Council of London and the Councils of Middlesex, Essex, and West Ham, and one by each of the other Metropolitan counties and the Conservators of the Thames and Lea. In this Board were to be vested all the powers of the Metropolitan Authority under the Metropolis Water Act, 1871, and those of the London County Council, relating to the Metropolitan Water Companies or to the supply of water—with certain exceptions. The Government attempt to deal with this subject met with a mixed reception. While their scheme was regarded by some as a practicable one, the measure by which it was to be carried out was characterized by others as a "wizen, attenuated, rickety little creature," which was not likely to solve the London Water Question. The Bill passed successfully through the House of Lords; but when it reached the Commons, it was found impossible to go on with it. It was recognized by many that the right course had been taken in not conceding absolute power to the London County Council; and when, in the course of the proceedings in the Lower House, a suggestion was thrown out that that body should take the place of the proposed Board, the antagonism of the outside authorities to the Council was displayed to such an extent that the scheme had to be abandoned. The efforts of the Government to settle this troublesome question were therefore futile.

The next proposal came from Lord Llandaff's Commission of 1897-9. The Water Board suggested in their report is to consist of not more than thirty members, who are to be "selected on account of their business capacity, and, if "possible, their knowledge of matters connected with water "supply." An important feature of the scheme, from our point of view, is that the Board is to be a permanent, not a fluctuating, body; and, moreover, it is to be so constituted as, in the words of the report, "not to give a preponderance "to any of the conflicting interests concerned." The idea of the Commission was that the London County Council should send one-third of the total number of members; the Conservators of the Thames, four; the County Councils of Middlesex, Surrey, Essex, Hertford, and Kent, the West Ham Borough Council, and the Lea Conservancy, two each. There are to be a Chairman and Vice-Chairman, to be appointed by the Local Government Board; and they are to receive "adequate salaries." The other members of the Board are to be paid according to their attendances. In this scheme no provision is made for separate representation of the City of London; but probably the Commissioners supposed that one of the County Council members for the City would be selected for service upon the Board. However this may be, the Corporation have expressed their dissatisfaction with the proposal as it stands, and have urged their right to representation. The Board are to be empowered and required to purchase the undertakings of the Water Companies, either by agreement or by arbitration, "on the terms usual in cases of compulsory purchase"—taking over all their existing powers and obligations. In order to meet the necessary expenses, the Board are to be entitled to issue a 3 per cent. stock, secured upon the water charges of the whole water area; and, by agreement, the vendors may be paid in such stock or in cash.

The scheme embodied in Sir Blundell Maple's Bill differs materially from the two proposals outlined above. The body which he suggests should be constituted is more than

twice as large as those contemplated by his predecessors. It is true that since Lord Llandaff's Commission reported, the Metropolitan Borough Councils have come into existence; and they and the City of London are considered worthy of representation to the extent of one member each upon the new Water Council. But though the body will be so large, the Executive Committee, who will really do the work, with the assistance of Sub-Committees composed of other members of the Council, is only one-third the size of the Board as proposed by Lord Llandaff's Commission. All the members of the Committee are to be appointed annually, and to be paid salaries; but those of the Sub-Committees will receive nothing. While Lord Llandaff's Commission laid stress on the importance of the new controllers of the London Water Supply being a non-fluctuating body, Sir Blundell Maple considers it advisable to allow for a change of members every three years. This was one of the reasons urged against the transfer of the water undertakings to the London County Council, and it always seemed to be a perfectly good one. However efficiently the Water Committees of Provincial Corporations owning water-works may discharge their duties, the exceptional circumstances of the Metropolitan Water Supply call for the constitution of a stable body, in order that something like continuity and consistency of policy may be ensured. The task of forming such a body is not by any means so easy as some who undertake it light-heartedly appear to suppose. It must not be so small as not to be fairly representative of all the interests concerned, or so large as to be liable to disturbance by many conflicting opinions. Though there are several good features in Sir Blundell Maple's scheme, we cannot, as stated at the outset, regard it as an effectual solution of the Metropolitan water problem. We therefore leave it, and wait for the proposals of the Government. Meanwhile, the control of the London Water Supply is in good hands.

ESSAYS AND REVIEWS.

ANNUAL REPORT OF THE CHIEF REGISTRAR OF FRIENDLY SOCIETIES.

Mutual Schemes under the Workmen's Compensation Act.

THE report published by the Registrar of Friendly Societies now includes, each year, much interesting information regarding the terms and the working of schemes adopted by employers and their men under section 3 of the Workmen's Compensation Act, 1897, which section is, rather misleadingly, summed up in the margin of the statute as providing for "contracting out." Referring to the recent extension of the Act of 1897 to workmen engaged in agricultural pursuits, the Registrar remarks that the experience gained under the Act has shown the benefits of mutual schemes "to be so valuable to the workmen that it may not be unreasonable to expect that the very considerable extension of the scope of the Act which has been effected by the Act of 1900 will lead to applications being made for the certifying of schemes of mutual agreement between workman and employer in agriculture." While this appears somewhat doubtful—agricultural labourers not being grouped together under one employer to the same extent as employees in factories, railways, and collieries—it is satisfactory to note Mr. Brabrook's unqualified approval (which, needless to say, we endorse) of the system of adopting a "mutual scheme," instead of merely leaving workmen to claim under the Act against the employer or his insurer.

These mutual schemes are *anathema* to the official Trade Unionist. If masters and men are going to adopt methods of settling claims for compensation that create a bond of good feeling between them, and leave no room for litigation—so often instigated by Trade Union lawyers of the decidedly "sharp" persuasion—or for the interference of the Trade Union Secretary, what will become of Unionism? This attitude of hostility on the part of the Unions towards mutual schemes does not exist in our imagination; nor do we argue its existence by inference. Section 3 was opposed by the labour members in the House of Commons on the ground of its tendency to check Trade Unionism, as we are reminded by an article in the "Economic Journal" for March, written by Miss Mona Wilson, the Secretary of the Women's Trade Union League. Miss Wilson says:—

> Contracting out, even in this modified form, met with strong opposition from Trade Unionists when the Bill was in the Committee stage; and since the Act came into force, the action of the Registrar in granting certificates to certain of the schemes has been severely criticized by them. This attitude is due to two causes: In the first place, *to a persuasion on the part of Trade Unionists that the principle of contracting-out is dangerous to their interests*, as tending to promote, in precisely the same way as any form of "shop club," what Mr. and Mrs. Sidney Webb have described as "*a vertical cleavage . . . which interferes with Trade Unionism.*" Mr. John Burns, M.P., opposed the general principle of contracting-out on these grounds in the House of Commons, "These contracting-out schemes sometimes precluded the poorest of our workmen from joining friendly societies, and absolutely prevented them from joining Trade Unions, and in this way made intimidation possible. . . . In practice, also, they tied men down to one district, and prevented the mobility of labour."

We have italicized the sentences which show the true reason of the opposition of Unionism to mutual schemes. It is not that they are "dangerous to the interests of the men," but that they are "dangerous to the interests of Trade Unions"—a very different matter. The argument of Mr. Burns that these schemes preclude the poorer workmen from joining friendly societies will not hold water. The report before us shows that, in the case of the railway employees, numbering 39,409, who have assented to schemes, the average contribution of each workman is a little over 1d. per week; while in the case of 17,799 hands employed in factories, the average contribution of each workman is just under ¾d. per week. To contend that such contributions—for which, be it noted, the men obtain benefits additional to those prescribed by the Act—preclude men from joining friendly societies is simple nonsense. This is shown very clearly by the fact that, in the case of miners, the average contribution is higher than in the case of railway and factory employees—exceeding 2d. per week. Yet a large percentage of miners are members of Trade Unions, and are not prevented from joining them by the burden of subscribing to the mutual schemes adopted at their collieries.

Altogether, the 123,289 workmen who had adopted schemes under section 3 contributed during the year ended June 30, 1900, £44,371; while the employers contributed £69,503. Taking into account: (*a*) The benefits other than death or incapacitation allowances, amounting to £6738; (*b*) the payments during the first two weeks of incapacity, and the subsequent payments in excess of those provided by the Act, which are estimated to amount to over £24,000; and (*c*) the increase of £37,923 in the funds of the schemes during the year, "it would appear," says Mr. Brabrook, justly, "that the workmen derived from these schemes a full equivalent for the £44,371 they contributed."

The Registrar remarks that, as the subject of the certifying of schemes by him appears to be much misunderstood—the Trade Unions are not anxious that the matter should be made too clear, they prefer to let it be assumed that the Registrar has a bias in favour of the employer—it may be worth his while again to explain the course of procedure. "No scheme is ever received for certificate without the signatures of the employer and of a substantial number of workmen. When, however, a scheme is certified, it is not of itself binding upon anybody. It is merely the foundation upon which the employer and any number of his workmen, few or many, may, if they please, contract out of the Act. A scheme might be certified and yet fall absolutely dead; no single workman adopting it. We cannot know, and have no concern in knowing, how many workmen will adopt the scheme. The only question we have the right to consider is: Is the scheme on the whole not less favourable to the general body of workmen and their dependants than the provisions of the Act?"

In order to assist him to so determine, the Registrar invites the free and confidential expression of opinions or objections by any of the men in the employment. "In many cases we have received valuable communications, to which we have given full consideration, and which have been of great assistance to us. These have, in several cases, been transmitted through the Trade Unions to which the workmen belong; but those Trade Unions have sometimes opposed the schemes upon grounds which would have prevented a certificate being given to any scheme at all. For us to act upon such representations would be to take upon ourselves the virtual repeal of section 3 of the Act," which is, of course, just what the Trade Union officials desire. Fortunately, Mr. Brabrook has no intention of lending himself to their ends. It is a favourite contention of the Labour leader that workmen are only induced to join shop clubs or adopt mutual schemes under the Compensation Act by fear of the consequences of a refusal—the only society that a workman voluntarily joins, we suppose, is a Trade Union, no member of which ever became so under the compulsion of his fellows! This always seems a very poor compliment for a Labour leader to pay to his followers. Mr. Brabrook has a better opinion of the working classes, and remarks, with truth, in regard to this allegation that employers have used undue pressure upon their men to induce them to contract out of the Act, that "it does not seem probable, having regard to the manly and independent character of the British workman, and his keen eye to his own interests, that there are many cases in which he has been induced to contract out under a scheme except by arguments that have convinced him that it was worth his while to do so."

The Registrar quotes an interesting paper read before the Manchester Statistical Society last year upon the working of the scheme adopted by the firm of Andrew Knowles and Sons, Limited—that being a scheme especially denounced by Trade Unionists. It has, indeed, been described as "the worst that has yet been brought to light." Nevertheless, Mr. Carlisle, the author of the paper in question, showed that, in eight cases of fatal accident which had then happened since the scheme came into operation, the amount of compensation paid was actually £1708, whereas that payable under the Act would have been only £1609; and that in four cases which happened before the scheme took effect the amount paid was £818, whereas had the scheme been applicable to them, the amount would have been £1270. In 668 incapacity cases dealt with under the scheme, the average weekly compensation was 11s. 11d.; while in 122 cases of workmen who

did not contract out, and were dealt with under the Act, the average weekly compensation was 4s. 9d. only—the difference being accounted for by the great number of cases in which the duration of disablement did not exceed two weeks. The masters and men in this case make equal contributions to the funds; but the contribution of the former is sufficient to cover all payments of death or incapacitation allowances, including those for the first fortnight—the men's subscriptions providing other benefits, and going to swell the funds in hand, which will probably suffice to grant pensions to aged workmen. Mr. Carlisle inferred from his comparison of this "worst scheme" with the results shown under the Act, "that the advantage is with the member of the accident society, who can with certainty look for compensation proportioned to the necessities of the case; who is freed from all questionings as to his claim being well founded, or as to its amount; and to whom payment will be made under properly constituted machinery out of a fund set aside for the purpose."

During the year ended the 31st of December last, only two fresh schemes were certified—one being adopted by a colliery, the other by the Woolwich Board of Health. The number previously certified and in operation on the 30th of June, 1900, had at that date been adopted by 123,289 workmen. In respect of 44 out of the 46 schemes, particulars are given of the total number of workmen in the employment, from which it appears that, although the Act provides that "no scheme shall be certified which contains an obligation upon the workmen to join the scheme as a condition of their hiring," yet in 33 cases the whole of the workmen in the employment joined the scheme. In the remaining 11 cases, the percentages of the total number who joined were 99 (3 cases) 98 (3 cases) 94, 91, 88, 81 and 21. The payments on death amounted to £13,199—the number of deaths from accidental injuries being 154; and in 108 of these cases dependants were left numbering 326, to nearly all of whom pensions were awarded, in addition to the sums payable on death. These pension allowances would be included in the item "other benefits, £6738." The number of cases receiving allowances for incapacity was 21,174; and those allowances amounted to £52,280.

In 25 returns, information is given from which a comparison can be instituted between the amount of the payment during the incapacity and the maximum amount that would have been payable under the Act, assuming all the cases of incapacity to have been such as would have entitled the workman to claim under the Act. From this, it appears that the actual payments exceeded the maximum payable under the Act by 80 per cent., or, if allowances for permanent disablement be included—and they are of special value to workmen—by 98 per cent. This is largely accounted for by the provision made for the first two weeks of incapacitation. The principal "factory" adopting a scheme under section 3, is the South Metropolitan Gas Company—the only gas undertaking to contract out. From their return for the year to June, 1900, we learn that the whole of their employees, to the number of 5327, had adopted the scheme. The amount subscribed by the men was £418; by the Company £962, who also bore the expenses of management. Other receipts amounted to £188, making a total income of £1568, which was expended in payments on death and to dependants £290; for incapacity, £1232; and for other benefits, £46. There were only two deaths from accident, giving a rate of 0·37 per 1000, as compared with an average for all factories of 0·62, of 1·27 in the case of railways, and of 1·41 in the case of mines—a comparison very satisfactory to the gas industry.

In conclusion, we may note that the English Act has been made the basis for a similar statute passed by the Parliament of South Australia, and assented to on the 5th of December, 1900. The Australian Act, unlike the English, specifically defines "dependants," "factory," and "undertakers"; and includes any employment declared by proclamation pursuant to addresses from both Houses of Parliament to be dangerous or injurious to health, or dangerous to life or limb. It is also extended to any building work, regardless of the height of the building. The Australian Act provides for "contracting-out" on similar lines to our 1897 Act.

THE REPORT OF THE ROYAL COMMISSION ON LOCAL TAXATION.

[First Notice.]

The long-expected final report of the Royal Commission on Local Taxation is a State document of the very first importance. Everybody who is interested in the vast subject of local government finance must have awaited with a particular eagerness the publication of the first authoritative statement covering the whole of the present system under which taxation is raised in the United Kingdom for local purposes. The subject of rating is of vital and increasing importance to every business man; and yet there is nothing among all our national affairs about which less is commonly known. The ordinary ratepayer is only aware that the rates continually mount up, notwithstanding the increase of rateable values; but the moment he consults a professed politician as to the reasons for this state of things, he receives a confusing answer or none at all. The first points upon which an inquirer into the subject would be likely to require enlightenment are very fairly embraced in the terms of the reference to the Commission, which directed that inquiry should be made "into the present system under which taxation is raised for local purposes, and whether all kinds of real and personal property contribute equitably to such taxation; and, if not, what alterations in the law are desirable in order to secure that result."

Although this reference is discharged by the present report, the matter cannot be regarded as ended. Ten interim volumes of memoranda and evidence have already appeared, and there are to be separate Scotch and Irish reports. Moreover the Blue-book which purports to be the final report of the Commissioners also contains so many separate recommendations, memoranda, and reservations of groups and individual members of the Commission, that the Government ought to appoint somebody to edit the whole of these publications, and show what they actually amount to. For lack of some elucidatory statement of the kind, it is to be feared that these Blue-books will be as though they were sealed volumes to the general public. We cannot, of course, pretend to supply this want; but we propose to explain to readers of the "Journal" rather more of the contents of the final report —officially numbered "Cd. 638"—than they will be likely to find in the newspapers.

In the first place, the Commissioners confess that when they came to formulate their final conclusions upon the whole subject referred to them, they were more than ever impressed with the complexity of the existing system, and the great variety of the considerations to which they were bound to have regard. They start with a definition of the "local purposes" for which taxation is raised, which they take to be the purposes for which local public authorities are now authorized to spend money. This expenditure is not entirely met out of taxation, since various receipts in aid accrue to local bodies, from sales of property, tolls, dues, gas charges, tramway fares, &c. The funds which are raised by taxation fall under two heads—namely, local taxes proper, which are now practically confined to rates, and subventions from the Central Government. The rating system of England and Wales is a very simple form of taxation, in so far as all rates are levied in respect of immovable property. It is complicated, however, in respect to the various areas over which rates are levied, and also by various classes of property being charged differently according to their nature. The system, as is generally known, dates from the Act of Elizabeth in 1601, which made the occupiers of lands, houses, tithes, coal mines, and saleable underwoods, liable to be rated for the relief of the poor. But the inclusion of the word "inhabitants" in this Act, as also "liable," led to a long controversy as to the rating of personal property, which was brought to a climax in 1840 by a judgment of the Courts favouring the rating of personality. This was overruled by a temporary Act—since renewed yearly—exempting inhabitants from liability to be rated as such, in respect of "stock-in-trade, or other property," to the relief of the poor.

So narrow, and apparently accidental, a barrier stands between all the "inhabitants" of the United Kingdom and the rating of some part of their personal belongings for local purposes. Not that the larger part of personal property—such as salaries, fees, wages, income from investments in stocks and shares, or from other securities—was ever decided to be rateable. This liability was only held to attach to corporeal property, such as stock-in-trade, which could be described as local, visible, and productive; but the whole practice in this regard was peculiar and anomalous. Since the Act of Elizabeth, very few additional classes of property have been expressly made assessable to local rates; while, on the other hand, a very large class—namely, stock-in-trade—has been directly exempted. It has to be remembered, however, that the terms "lands" and "houses" have been given a far wider application than they had in 1601, and extend to classes of property which nobody dreamt of at that period. Instances of this expansion in properties (generally in the hands of companies) are railway lines and stations, gas-works, water-works, sheds containing machinery, &c. Generally speaking, all rates are made directly payable by the occupiers, who know of this liability when they undertake to pay the rent *plus* the rates.

In 1836, the Parochial Assessments Act defined the standard by which the value of properties for rating purposes should be determined. This was to be the annual rent which a tenant might be reasonably expected to pay for the hereditament. Thus the Legislature contemplates letting at a yearly rent as a normal, or at least a conceivable, condition of rateable property. It is acting literally according to the sense of the lines which tell us that "the worth of anything is just as much as it will bring" in the way of rental. In the case of a very large proportion of agricultural properties, and of much urban property, the letting is actually done upon terms sufficiently near to those contemplated by the Act. The rating of these hereditaments is therefore easy and obvious. With regard to many classes of modern buildings, such as workhouses, public edifices, and the like, which are never let, the practice has grown of treating them on the principle of "contractors' rent"—that is, a percentage is taken on the value of the buildings, and added to a percentage on the value of the site. The sum is evidence as to the rent at which the property might reasonably be expected to let from year to year. A further peculiar difficulty arises with the rating of railways, gas-works, and property of a similar nature. "In such cases, the Courts have approved of a method of valuation starting from the profits earned, and arriving at the annual value of the rateable portion of the undertaking by a series of deductions." The reason suggested for this variation on the original rule is that "these under-

takings have to some extent the character of monopolies; and, therefore, the rent which a tenant would give cannot be determined by merely taking a percentage on the cost of construction." If this is so, the inference would appear to be that it is high time the hypothesis were corrected to agree more closely with modern facts. The above is a summarized description of the principal methods employed to ascertain the value of rateable property.

An important section of the report, which is divided into chapters, relates to "Subventions." With this subject we have nothing in particular to do. A promising chapter is that bearing the heading "Grievances of Ratepayers," which really takes several other chapters to discuss in detail. Prominent among these grievances is the list of national services which are thrown upon local resources. This list includes Poor Relief, Police, Education, and Main Roads; and it is admitted that the cost of these ought to be defrayed by the Central Government. There are, however, insuperable administrative objections to making this transfer. Descending to the particular question of the disadvantages of the rating system, it is asserted that rates fall very much less than taxes in accordance with ability to pay. The Elizabethan principle of rating was all very well at the period, and was then probably intended to tax everybody according to his means and substance. But it does not do this now. While all sorts of expenses of local administration have been piled upon the old rating, this does not (except in the cases of gas-works, railways, &c.) rest upon the occupiers' ability to pay, but only on the annual value of the residence he elects to occupy.

This arrangement does not seem fair; but, as the report allows, when one begins to consider the alternative suggestion, of a local income-tax, that way is quickly seen to lead to chaos. The discussion on these matters is very interesting. It is admitted that the taxation for local expenditure is levied on too small a basis, and that sufficient variety has not been given to the means by which the revenue required by local authorities is raised. Moreover, those contributors who possess and enjoy property not rateable, are placed in too favourable a position as compared with the owners and occupiers of rateable property. The man who drives a gig, for example, derives more benefit from the expenditure on the highways than the man who perhaps pays more for the maintenance of the roads and has less enjoyment of them. The difficulty is to find a remedy. It is startling to learn that, for lack of such a reasonable alternative, 82·8 per cent. of the entire local tax revenue is derived from the rates—that is, from a single tax levied upon particular classes of property. This might be pardonable if the one tax could be described as faultless, or if the amount required to be raised were inconsiderable. But as it is, the enormous growth of the amount required to be raised by local authorities since the commencement of the modern *régime* of local self-government has only accentuated the inequality and inequity of the means by which so large a proportion of that revenue is raised—defects, it is observed, which are apparent whether the question is considered from the point of view of the ownership or the occupation of rateable property.

Those ignorant and perfervid "Progressives" in local politics who are always for putting something more upon the rates, are blind to the unfairness of charging the ratepayers for superfluous reading libraries and all sorts of miscellaneous extravagances, which people who fancy them ought to pay for themselves, or go without. The owners of rateable property contend that, with regard to the portion of the burden which finally falls upon them, the system takes no account of their ability to bear it. Affluent owners pay no more than do the hundreds and thousands of poor people who have purchased rateable land and houses through the agency of building and other similar societies. This is how it works out: If A puts his savings into land or house property, he pays a heavy and an ever-rising tax upon it. If B puts an equal amount into corporation stock, he pays nothing on the same account. Indeed, A is rated to help pay B's interest. Hence the argument that "there is no reason why the owners of rateable property should be singled out for taxation to the exclusion of owners of other property."

Then, the occupiers also have their particular objections to the existing system. They urge that the system takes no account of anything in their circumstances besides the amount of their expenditure on "a consumable commodity called a house." Such a measure of taxable capacity operates with especial unfairness on the wage-earning and lower middle classes, inasmuch as the proportion of their total expenditure for living which goes in house-rent is much greater than is that of the wealthier classes. Again, the occupier who, for family or business reasons, is compelled to occupy a heavily-rated house, is overburdened in comparison with the man who, not having such a load, is enabled to live in greater luxury at just the same total charge. Lastly, rates make no distinction between the case of a man who has to struggle hard to keep a roof over his head, and that of the capitalist who can sleep soundly upon his investments. Thus the objections to the existing system are not a matter of difference as between owners and occupiers, as some politicians pretend; but the Commissioners admit that both these classes have legitimate cause of complaint, "owing to the fact that the basis of local taxation is too narrow, too much dependence being placed upon a single tax, and no means of counterbalance and adjustment being afforded as is the case in the more varied system of taxation adopted for Imperial purposes."

This is a pronouncement of extreme value for the ratepayer. It is the first authoritative recognition of the fact that these particular grievances of the ratepayer, whether owner or occupier, are genuine. This concession establishes a solid basis from which to consider the various expedients that have been adopted by successive Governments for relieving the pressure upon the ratepayers, when it had become intolerable, by subventions from Imperial funds. It constitutes an admission that the rate-funds have a right to such assistance, in default of that alternative widening of their basis which appears to be unattainable.

Before the year 1888, nobody seems to have had a glimmering of this truth of the ratepayers' position. When sufficiently pressed, Governments gave grants-in-aid to local treasuries; but there was no principle in the proceeding, which was consequently open to abuse. In that year, Mr. Goschen superseded grants-in-aid by a new fund called the Local Taxation Account, to which certain sources of revenue were appropriated. The majority of the Commissioners find that the arrangement has worked well, and suggest that it might be modified and supplemented with advantage. They think that the principles of the Act of 1888 should be adhered to, and that later complications should be removed. Broadly stated, these principles are that Imperial and local finance should be completely separated; and that the diversification of the latter is to be effected by means of the surrender of particular revenues.

ELECTRIC LIGHTING MEMORANDA.

The Cost of Working the Waterloo and City Railway—The Doubt as to the Economy of Electric Traction—The Case of the Metropolitan Lines—The American Proposals.

THE half-yearly reports and meetings of the Railway Companies are filling the papers just now; and it is natural that this intelligencc should be scanned for something to throw additional light upon the question of electric traction. A small announcement, but of much significance in this connection, is that relating to the results of the working of the Waterloo and City Railway for the half year. The report of the Directors of this line states that the gross receipts, less Government duty, amounted to £16,315, and the working expenses to £8937 —being at the rate of 54·78 per cent. of the receipts. The difference between these amounts is not sufficient, by the sum of £1567, to pay the guaranteed 3 per cent. dividend on the capital; and the deficiency has been made up by the London and South-Western Railway Company, who work the line. Now it is quite clear that, unless this high working cost can be explained and referred to some exceptional cause, the hope of many people, that electric traction may prove a means of economizing on the cost of working railways by steam, will be seriously affected. There is the Metropolitan District, for example, which has been so much discussed of late—what is to happen if, after conversion to electric traction, the running expenses of the line still amount to 55 per cent. or thereabouts, of the earnings? That notorious American deal would suffer a total eclipse.

This bad showing of the Waterloo and City Railway is remarkable for several reasons. It is a short feeder line for the busiest London passenger terminus, and has not to tout for custom. It is successful in catering for the public need which it was designed to satisfy, though it is handicapped by wearisome approaches at both ends, which destroy much of the saving of time by the actual line. There are no intermediate stations to add to the expense of working, the costliness of which is therefore all the more puzzling. In connection with this observation, it is worth noting that a German Technical Commission is about to ascertain experimentally the working data of a high-speed electric railway. It is confessed by the German engineers interested in this scheme that they do not know how the cost of electric working will compare in practice with steam; and they are going to learn. Meanwhile, the passing by both Houses of Parliament of the Bill for the construction of the monorail electric express railway between Manchester and Liverpool tends to force the same question towards a solution in this country. Yet obviously, if this particular scheme should be successfully carried out, it would not necessarily bring nearer the electrification of our main lines of railway, with all their various traffic.

The circumstances of the two Metropolitan Railways, in respect of electric traction, have been further discussed before the public and summed up in a "Times" leader. According to the official statement of the Chairman of the Metropolitan Company at the recent general meeting, everything was going on swimmingly between the two Companies until the advent of Mr. Yerkes and his American Syndicate. After toying with the subject of electric traction all these years—and how much justification there was for delaying a decision on the matter, engineers and electricians certainly know better than the public—the Directorates of the "underground" lines found themselves brethren in affliction, owing to the celerity with which the travelling public transferred their patronage to the new "tube" line. It was time to make the plunge into the unknown; and the Ganz system was selected as offering the best and most economical exchange for steam locomotion. But Mr. Yerkes was not interested in this system. He knows a little more about the technics of electric traction than Colonel Mellor, the present Chairman of the Metropolitan Company, and consequently easily scores off the latter in controversy. "The Times" seems to think rather more of this than

the case warrants. It asserts that Colonel Mellor, in cross-examination by Mr. Pember, failed to give any very intelligible reasons for his faith in the Ganz system. But that is no discredit to Colonel Mellor, although it may be a reflection on the merit of our national system of entrusting railways to amateur chairmen. While our railway chairmen are lords, and retired soldiers, and wealthy squires, it is folly to pit them in controversy against American "Presidents," who usually know their business.

This appears to be the chief cause of the Metropolitan trouble. Colonel Mellor may not be a railway expert, like Mr. Yerkes, or his colleague at the head of the District Company; but he has a firm grip of certain data which have been given to him by his advisers. He knows the terms upon which the Ganz system is to be had; and they are far below the demands of the American Syndicate. Consequently, he dismisses their proposals as exorbitant, and denies that they are worth all that is asked for them. The awkwardness of the position for the Yerkes contingent is that these facts are undeniable. The American project was to do everything and furnish everything needed for working the Metropolitan line electrically at a modest charge of only ¾d. per passenger carried. It sounds little; but it comes to very nearly £300,000 a year. As the American investment would only be £700,000, it certainly looks, as "The Times" remarks, as if they meant to secure a very fair return upon their money. Besides, Colonel Mellor can show that the service for which this payment is asked actually costs the Metropolitan only £101,000 a year. This does not tend to encourage the belief that electrification of the line would be any great "catch" for the proprietors. Finally, Mr. Yerkes has offered to take over the whole line, pay all fixed charges, and guarantee the shareholders a perpetual 3½ per cent. dividend; whereupon Colonel Mellor declares that he likes not the security. So for the present the matter hangs.

THE GAS AND WATER STOCK MARKET.

THE week just closed on the Stock Exchange was a decided improvement upon its predecessor in point of tone. Business, of course, was limited, having regard to the closure from Friday until to-day. And there was no disposition to embark in fresh commitments; attention being chiefly directed to the settlement of the current account. Happily, this gave every promise of going through without giving rise to any difficulties; and this assisted to produce a good feeling. Consols, too, were rather firmer; but railways continued depressed by unpleasing dividend announcements, and the case of the District line was particularly uninviting. The Money Market opened very easy in view of abundant supplies; but the strong demands in connection with the Stock Exchange, and the usual month-end requirements, caused perceptible tightening. In the Gas Market, business was at a low ebb, and quite devoid of feature. Quotations hardly moved, and most issues just marked time. However, the actual changes accomplished showed a favourable disposition. In Gaslight and Coke, business was done in the ordinary at pretty steady prices, though with a tendency to weaken towards the close. The market will have time before the reopening to consider the position and prospects as illuminated by the proceedings and declaration at the general meeting of Friday. The secured issues were in better favour, and the preference advanced a point. South Metropolitan was very quiet and unchanged. Commercials were quite neglected. The issue of the last two Companies' accounts will complete the Metropolitan record for the first half of 1901; and it is confidently expected that they will show a pretty satisfactory state of things. The Brentford Company's accounts point to a nice increase in the business; but the stock did not move in the market, nor did any other in the Suburban and Provincial group. The Continental Companies were equally conspicuous for their unruffled calm. The undertakings located in the remoter world furnished only one example of mobility. Melbourne 5 per cent. bonds advanced a point. Business in the Water Companies was almost as active as in Gas; but there was hardly any movement in values. West Middlesex had an advance of 3.

The daily operations were too insignificant to call for further detailed notice.

Irish Association of Gas Managers.—The annual meeting of this Association will be held in the Mansion House, Dublin, next Tuesday, under the presidency of Mr. W. A. Reid, of Longford. We learn from the programme issued by the Hon. Secretary (Mr. James Whimster, of Armagh) that, in addition to the President's Address, there will be three papers and a lecture. Mr. J. G. Tooms, of Waterford, will deal with "Difficulties with Gasholders;" Mr. C. B. Tully, of Sligo, will present some "Notes on Water Gas;" and Mr. S. B. Langlands, of Coleraine, will consider the question of "The Relation of Consumers to the Gas Manager." The lecture will, as usual, be delivered by Professor W. Ivison Macadam, of Edinburgh; his subject being "Coals: Their Composition, Properties, and Uses." Arrangements have been made for an afternoon excursion by rail and electric tram round the Hill of Howth, to the St. Lawrence Hotel, where dinner will be served. Permission has been given for the members to visit the locomotive works of the Great Southern and Western Railway of Ireland, at Inchicore, on the following day,

PERSONAL.

Mr. BRYAN DONKIN, M.Inst.C.E., has been elected a Director of the Crystal Palace District Gas Company, in place of the late Mr. Frederic Lane Linging.

Mr. C. B. NEWTON has resigned his position as Gas and Water Engineer to the Carlisle Corporation. He handed his resignation to the Mayor at a special meeting of the Town Council held last Tuesday; the reason assigned for the step being "the trouble which has arisen in regard to the water scheme." The resignation was accepted; and it will take effect three months hence.

We learn that the vacancy at the Crystal Palace District Gas Company's works caused by the removal of Mr. G. P. Lewis to Aldershot has been filled by the appointment of Mr. R. ENGLISH as Assistant to Mr. S. Y. Shoubridge. Mr. English has for upwards of two years held the position of Chief Chemist to the Company; and before taking it he was in the service of the Gaslight and Coke Company at Beckton.

Mr. J. A. BELLAMY, Chairman of the Plymouth Gas Company, has consented to be nominated for the office of Mayor, in succession to the late Mr. R. Risdon; and it is expected that his election will take place in the course of a few days. He will hold office till November, 1902. Though Mr. Bellamy was selected by the Conservatives, their choice has received the unanimous support of the Liberal party—a striking testimony to the New Mayor's popularity.

Mr. ALEXANDER ALLAN, the Gas Engineer to the Nelson and Marsden Corporation, has been appointed Manager and Secretary of the Scarborough Gas Company, in succession to Mr. John Holliday, who, as announced in the "JOURNAL" for the 9th ult., has been selected for the position of Resident Manager of the Sutton, Southcoates, and Drypool Gas Company. Mr. Allan was formerly at the Bankside station of the South Metropolitan Gas Company, whence he removed to Sheffield, to take the management of the Neepsend works of the Sheffield Gas Company. In November, 1899, he was appointed Manager at Nelson; Mr. W. Foster, who had for many years held the position, being retained as his assistant.

We have much pleasure in announcing that Mr. THOMAS GLOVER, Gas Engineer to the West Bromwich Corporation, has been selected to fill the position of Engineer of the Norwich station of the British Gaslight Company, rendered vacant by the removal of Mr. John Young to Hull. The event calls for a two-fold congratulation—to Mr. Glover on his success, and to the Directors on securing his services. He is young, has had excellent training, and has shown, by his public performance, if the expression may be allowed, of what stuff he is made. His early training was with his brother at St. Helens; but about nine years ago he went to Carlisle, where he had the advantage of working under Mr. Joseph Hepworth. He obtained the West Bromwich appointment in 1895, in succession to Mr. W. Littlewood; and during his tenure of it he has effected some notable changes in the gas-works, not the least being the introduction of the Dellwik-Fleischer water-gas plant—the first installation in England—which was inaugurated only a few weeks ago, when the works were visited by the members of the Midland Association of Gas Managers, of which Mr. Glover is President. We cordially wish him success in his enlarged sphere of operations, and health and happiness in his new (and more picturesque) environment. It is a curious coincidence that when Mr. Young went to Norwich from Etruria in 1897, he too was occupying the position of President of the Midland Association.

In the last number of the "JOURNAL," we expressed gratification in recording the completion by Mr. JOSEPH MORRIS, the Engineer and Manager of the Jersey Gaslight Company, on his 71st birthday, of his fifty years' professional connection with the Channel Islands. Mr. Morris entered the gas-engineering profession in February, 1846, as a pupil of Mr. David Methven, who was at that time Manager of the Coventry Gas-Works during the lesseeship of Mr. A. A. Croll. On the lease being taken over by Messrs. Robinson Bros. (one of whom recently died), Mr. Morris remained with them until 1851, when he was asked by Mr. Croll to take charge of the Guernsey Gas-Works. He entered upon his duties on July 26, 1851, and found the works in a most primitive condition, with only 296 consumers, who paid 7s. 6d. per 1000 cubic feet for their gas, producing a rental of £1436. He set about remodelling the works; and when he left them in 1863, they were supplying 14 million cubic feet per annum to 925 consumers, who paid 5s. per 1000 cubic feet, yielding a rental of £3481. Mr. Morris then entered the service of the Jersey Company; and he has lately been engaged in reconstructing their works, which are approaching completion. In commemoration of his jubilee on the Islands, he invited his Directors to dine with him on the 26th ult.; but, as evidence of the changes which have occurred, with the exception of the Chairman (M. Gallichan), not a single member of the original Board remained.

The death is announced of the Rev. John Gritton, D.D., for 25 years Secretary of the Lord's Day Observance Society, and known to many of our readers in connection with his exertions to abolish Sunday labour in gas-works. He was in his 72nd year,

NOTES.

Light Treatment of Diseases.

It would be interesting to know if there is any prospect of the application of the light of high-power incandescent gas-burners to the new treatment of disease by light. This treatment, which is technically called phototherapy, has been worked out by Professor Finsen, of Copenhagen, until it has now a recognized place in the domain of therapeutics. The bactericidal action of light was brought before the Royal Society by Downes and Blunt in 1878. There was every reason to suppose, therefore, that superficial diseases of the skin caused by bacteria might be curable by the application of light. Professor Finsen concentrated the light of the sun by lenses, and found that lupus yielded to the treatment. The apparatus for utilizing the electric arc light in the same way is very costly and complicated. A large arc, of 30,000-candle power, is employed; and the light is concentrated and focussed by a kind of telescope. One of the drawbacks of the system is its cost. Every lamp costs about £400 a year. If a cheaper system of lighting could be devised, and made convenient of application in small hospitals and dispensaries, there is no doubt that the use of the treatment for some of the most distressing of human diseases would be widely adopted.

A Cement Testing Instrument.

The English technical journals make favourable mention of a new instrument for testing portland cement, called by the somewhat uncouth name of "flourometer." This apparatus measures the proportion of impalpable powder, which is the only cementitious ingredient, of a sample of cement. It is the invention of Mr. W. F. Goreham, of Belvedere, Kent. Hitherto the fineness of cement has been tested by weighing the portion of the sample which could pass through the meshes of a specified sieve. Formerly, a cement was regarded as finely ground if the residue left upon a 50 sieve was 10 per cent.; but now it must not be more than 5 per cent. of the original quantity. There is an economical limit to the value of grinding, which is arrived at when the cost of finer grinding is more than that of the extra quantity of cement required to be used to make up for the coarseness. In the flourometer, a weighed sample of cement is blown by a current of air until all the flour is winnowed out of it and collected into a receptacle. The percentage of the impalpable flour indicates the relative value of the sample. It is reported that the best English makes of cement come out exceedingly well by this test, which is claimed to be altogether different from the test by separator, long known in the trade.

A German View of Iron Rust.

Discussing the rusting of iron and steel, a German technical publication remarks that the problem of preventing this chemical action has never been satisfactorily solved. All so-called rust preventatives are merely palliatives, in practice more or less effectual according to the care that has been exercised in the application. The susceptibility of iron to rusting seems to be affected by its composition. Manganese appears to promote corrosion, while silicon counteracts it. The only real protection for iron is coating it with the black oxide, which cannot be done to large scantlings. Another process, oxidization, has been proposed, but has not been tested practically. It rests upon the theoretical fact that when iron is coated with a solution of hydroferrocyanic acid, it becomes coated with a thin homogeneous layer of Prussian blue. In the experiment, the alcoholic solution of the acid named, with the addition of a little turpentine, is mixed with boiled linseed oil and applied as a paint. As a paint, preference is given to zinc oxide, rubbed down with boiled oil, which is found to be very durable. The writer observes that, apart from an oxidation process, the best anti-corrosive treatment of iron is the application of a priming coat of old boiled oil, to which some oxide of iron has been added, followed by a coating of zinc white.

Strength and Weight of Cinder Concrete.

Mr. F. E. Kidder has described, in the "Engineering Record," some experiments with cinder and cement concrete. Slabs of the concrete were made in a box 6 ft. 9 in. long, 18 inches wide, and 4 inches deep. Coarse, sharp sand was mixed with the cinders in the proportion of two to five, and one of cement was added. The mixture was thoroughly made, both dry and wet; and no more water was used than was enough to work the concrete easily and cover the cinders with mortar. When the slabs were 24 hours old, the sides of the box were removed; the slab still resting on the bottom. When four weeks old, the slabs were tested by being made to bridge a couple of girders, and were loaded with a wooden platform 16 inches wide, upon which bricks were piled until failure took place. The slabs were bedded upon the beams with neat cement. The results differed through a considerable range, according to the quality of the cement. An equivalent distributed load of 92 lbs. per square foot was the highest result; and 31 lbs. per square foot was the lowest. The average weight of the concrete was 93·6 lbs. per cubic foot. On this basis, a cubic yard of concrete would require 5·32 cubic feet of cement, 10·64 cubic feet of sand, and 26·6 cubic feet of cinders. According to this writer, cinder concrete cannot be made of less weight than 90 lbs. to the cubic foot.

Action of Gas upon Leather Bookbindings.

The Society of Arts some time ago appointed a Committee to investigate the subject of the decay of leather bookbindings. The report of this Committee has appeared; being printed in full in the "Journal" of the Society for the 5th inst. It is stated that there is ample justification for the general complaint that modern leather used for this purpose is not so durable as that employed earlier than 1860. With regard to the conditions under which books are kept—ventilation, lighting, heating, &c.—the Committee were satisfied that in libraries not artificially lighted, and where the ventilation was good, the bindings were generally in a better state than elsewhere. Where gas is used, the bindings are in the worst state noticed, especially on the higher shelves. Books kept in much-used rooms are generally in a bad state; but whether this is due to gas or other fumes, cannot be decided. Tobacco smoke is certainly injurious. Daylight, and still more direct sunlight, has a disintegrating effect on leather. Books kept in cases with closely-fitting doors are generally in a better condition than those exposed directly to the atmosphere; but if damp should get into the cases, the books in them suffer more than if exposed to good ventilation. As to the leathers, the old preparations are too stiff and hard for modern requirements. Modern leathers, especially Russia, all rot out in fifty years. On the whole, the Committee came to the conclusion that a pure sumach tannage will provide a good and suitable leather. The Committee also consider that the bookbinder must share with the leather manufacturer and librarian the blame for much of the premature decay of leather bindings. They believe that the fumes of burnt gas are the most deleterious of the influences to which bound books can be exposed. Both light and hot air possess injurious influences which had scarcely been suspected previously; and the importance of moderate temperature and thorough ventilation of libraries cannot be too much insisted on. Now that the nature of the mischief has been ascertained and its operation distributed, there is no reason to suppose it will not be possible to preserve books from it, and keep them on open shelves for a very long time.

TECHNICAL RECORD.

GAS ENRICHMENT.

At the close of the paper on the above subject read by Mr. A. Yuill, of Alloa, at the recent annual meeting of the North British Association of Gas Managers, and given last week (p. 277), the following discussion took place :—

The PRESIDENT (Mr. W. R. Herring), in opening the discussion, said he wished to express his indebtedness to Mr. Yuill for the information he had given the members. He appeared to have started on the right lines. He had begun at what might be termed the fundamental basis of the thing. He first of all found out whether his gas was capable of enrichment by benzol. Having found that out, he proceeded to do it; and he had given them the benefit of his proceedings and experiments, and had shown them a statement of the costs, from which they saw that it required, approximately speaking, 1d. per candle for cannel and 0·31d. for benzol. He (the President) thought it was a pity he had not put his figures in his address with the same precision as Mr. Yuill had done. He was not capable, at the moment, of presenting them to the members; and he thought Mr. Yuill's figures agreed pretty closely with his own. He had given them the figures per 1000 foot-candles; and Mr. Yuill had stated them per candle of enrichment. There was no doubt there was a big field in Scotland—the land of cannel coal—for this method of enrichment by benzol. They would have to bring the cannel coal people down to a reasonable state of mind. Let them have this material at even twice the cost of splint, and then they should not complain, upon that basis, but upon that basis only. He was sure there were gentlemen present who had had large experience with the process, and he would be glad to have some criticism of Mr. Yuill's paper.

Mr. A. WADDELL (Dunfermline) said he believed he was the first in Scotland—at least at the time—to take up the method of enriching gas by benzol. He thought Mr. Yuill had given all that, in theory, it would be well to put before the meeting; and he considered it would be quite enough that he (Mr. Waddell) should tell them his own little experience in the matter. In May of last year, when the price of coals—cannel among others—had risen so very much, he felt it was necessary to do something to enable them to make gas at a more reasonable rate than coal would have enabled them to do. A good deal was being said about benzol enrichment in England and other places; and he went into the matter. He made a good deal of inquiry at a few places in England where they had started it; and, after much consideration, he decided in its favour. He could assure the members that since then he had felt it was the best thing he could very well have done. He would not do otherwise to-day. Indeed, only two or three months ago, he recommended the Commissioners of Dunfermline to introduce the process; thereby showing that this was still his opinion of it. A good deal had been said about benzol vapour not being one that might continue in the gas; but he thought Mr. Yuill had pointed out quite sufficient on the subject—that the enrichers in the case of coal were for the most part benzols and that a vapour

might be put in in such a way that it would not remain in the gas. But he said that, for all practical purposes, there was no difficulty whatever in benzol enrichment, as regarded permanency. No doubt it was important to notice the particular coal they had to enrich; and while Mr. Yuill had pointed out that gases taken off the coal at high temperatures were suitable for benzol enrichment, he believed it would be admitted at the same time that there was such a thing as carrying that too far. He considered Mr. Yuill had also admitted that in his remarks about water gas, which contained a large quantity of carbonic acid and carbonic oxide. Seeing that in coal distilled in the usual way there was a good deal of the latter taken off at the tail-end of the charge, he thought they must avoid keeping the charge too long in the retort. There was another point in connection with enrichment in Scotland, and this was that if there was a certain gain per candle from enrichment with benzol in England, where they enriched 1, 1½, or 2 candles, there was not such a field for gain as there was in Scotland, where they enriched to the extent of 6 candles. He did not know that there was much more he could say, beyond this—that he understood those who had gone in for benzol enrichment were all very well satisfied with it. He did not know of anyone who was otherwise; and it was just a question of how long it would continue to be an economical thing to do.

Mr. A. Bell (Dalkeith) remarked that benzol enrichment had not been very much in vogue in Scotland. Many of those present, he was sure, would remember the Young and Aitken "analyzer." It was fully commented upon and experimented with in Scotland. He himself used one. He was abroad at the time, in a warm climate, and making English gas; and he thought it would do for his purpose, to keep up the illuminating power. They were making 16-candle gas, from Durham or Newcastle coal, with 5 per cent. of Wigan cannel as an enricher. By using the analyzer, which was simply a tower 30 feet high and 6 feet in diameter, with trays, the condensation was fractional. All the distillate from the coal went from the hydraulic main to the bottom of it, where there was a steam coil by which it was heated up to about 212° Fahr. The crude vapours went up with the gas, super-saturated, and fell down from tray to tray; but when the gas came to the top, it was cooled down to atmospheric temperature, and it was super-saturated to such a degree that it rained naphtha. It was then passed through an ordinary condenser. The benzol vapours which went forward he found would travel about 500 yards from the works. After that, practically nothing was deposited, and no fraction of naphthalene was ever seen throughout the whole system; the gas, of course, being so highly charged with benzol vapours that it dissolved off, and never deposited again. The difference in the illuminating power, even to the farthest extent of the mains, was about 4 candles—from 16 to 20 candles. He used the apparatus for two years. He would suggest whether they were not going back upon something of that sort now, if they intended to adopt benzol. They sent their tar to a distiller, and they had now to purchase it back as benzol. Of course, with the apparatus he spoke of, the value of the tar would be lessened to the extent of the benzol which was retained. He was going to ask about condensation in very cold weather. He should think that extreme cold would lower the illuminating power of the gas. Another difficulty he had was that Mr. Yuill had not told them how he overcame a fluctuating make. They knew very well that in large works things would go on satisfactorily, but that in small ones the make varied very much. Was it a constant quantity he put in, or was it automatically regulated in any way? In very warm weather, benzol vapours would travel throughout Glasgow; but that was not the question. The point was, Would they get the same illuminating power with the same quantity of benzol when it was very cold?

Mr. A. MacPherson (Kirkcaldy) said that, like his friend Mr. Bell, he was old enough to remember the Young and Aitken analyzer. He considered it had a very fair trial in this country—in fact, when it was introduced they were all perfectly charmed with it, and thought that at last they had got the coalmasters in their hands. But, alas! they found they were making a mistake; and he believed they would find that the rock on which the analyzer split was very much the one on which, he feared, the benzol process would come to grief, and that was when it came to face a thoroughly Scotch winter. They knew benzol was distilled from cannel coal; but Mr. Yuill and the other benzol gentlemen must surely have forgotten that it was in a very different form from what it was when put in by a carburettor. It was a mere mechanical suspension, and not a chemical combination such as they had in the gas from the retort. It was a vapour in the gas. He was perfectly certain that in the rigour of a Scotch winter they would find that the whole, or nearly the whole, of the benzol would be deposited in the mains. Since the introduction of the process into Scotland, he did not think they had had to face a really hard frost for a continuous period of perhaps a couple of months, as they occasionally had. The past winter had been a very mild one, and therefore not one calculated to put the benzol-enriched gas to a proper test. He would be very pleased indeed if it should turn out a success. He thought the cheapness of the process was most remarkable; but, of course, it was possible to buy gold too dear. If they merely went through the form of enriching at the station meter, and the enrichment never reached the consumer, it would be of no use to anybody.

Mr. J. Brodie (Coupar Angus) thought one thing was not quite clear from Mr. Yuill's paper. He said the best way to put the benzol into the gas was at a pressure of 30 lbs. That was what was done in a large-sized Maxim carburettor. Would he recommend, in small works, an arrangement with such an injector to force the benzol in at a pressure? He (Mr. Brodie) would like to know whether Mr. Yuill put the benzol into a holder or directly into the main. He had heard the argument that when benzol went into the holder it deposited in cold weather, but that a hot, sunny day would lift it off the water. This was something he did not believe.

Mr. Forbes Waddell (Broughty Ferry) would admit to having had a little condensation; but it was only fair to mention, as Mr. MacPherson had spoken about the weather, that it was in a particularly hard month—February last—and that at the time, they were making 16-candle gas, using nothing but splint and a common coking coal. About two-thirds of the distance to the boundary of Broughty Ferry they got 23·07 candles. It was all very well for certain people to talk about the benzol business fizzling out; but he did not think those who had not tried it on the present lines were entitled to say anything about it, in view of the fact that there were some who had had experience of it.

Mr. MacPherson: We have gentlemen who have had experience with oil, and I do not believe there is one using it at the present time; so that I think Mr. Waddell's contention is entirely out of place.

Mr. Waddell said Mr. Yuill, in his paper, had stated his reason for not using the Peebles oil process now, and it was not because of the process. He expected that when Mr. MacPherson spoke of benzol, he was speaking of benzol enrichment quite independently. With regard to it, he thought it was quite sufficient for anyone who had tried it. At all events, it had been tried in a good many small works, where the make was very fluctuating, and it had answered quite satisfactorily. Even if it should not be a success in a hard winter, they could take in some cannel coal, and use benzol as far as it would go. The price of coal made it almost impossible to use cannel for enrichment; but Mr. Yuill had given the cost of enriching ordinary coal gas half-a-dozen candles by benzol as 1·815d. From a ton of common coking coal they got a good deal better coke than they did from a mixture of coking coal and cannel; and then, by adding 1s. 6d. worth of benzol, they obtained as much illuminating matter as from cannel, for the price of coking coal—say, 9s., as Mr. Yuill had given it. Supposing benzol should cost 2s., where could they buy cannel which would give them 23-candle power for 11s. just now? He did not believe such a coal was in the market; and he thought it would be very difficult to get past that remark.

Mr. D. Vass (Airdrie) thought the question they had to consider, as gas managers, was, in the first place, one of cost; and Mr. Yuill had not favoured them with the figures of the cost of the apparatus. He (Mr. Vass) had gone into the question very fully, and his impression was that, supposing they had a severe winter, and had to use cannel enrichment for 50 or 60 days in mid-winter, by using benzol for the rest of the year they would be able to pay off the whole cost of the apparatus in twelve months, and they would then have the apparatus beside them as a stand-by. This, he thought, was sufficient to justify anyone considering the question immediately. Very possibly the price of benzol next year would be such that it would not pay to use it; but the house-room occupied by the plant was so small that, even in his crowded place, he was quite prepared to face it.

The President said that, so far as any reference had been made to the gas derived from cannel and from benzol, it appeared to be that cannel gas was absolutely permanent. He had found that it was not. No doubt there were gentlemen present who had had experience with cannel coal, and they might state their views as to the permanency of cannel coal gas under stress of a severe winter.

Mr. W. B. M'Lusky (Perth) said the remark as to the permanency of cannel coal gas, as compared with benzol enrichment, had suggested a point to him. About ten years ago he was in the rather fortunate position of having a jet photometer in his house, and he could compare it daily with the bunsen flame at the gas-works. The gas travelled about three miles before it reached the house. He found that in severe weather, with a temperature of 42° Fahr., the illuminating power fell about 2¾ candles. He was using at the time No. 1 Muirkirk cannel as an enricher. This was rather a serious loss; and it went to the support of Mr. MacPherson's remark regarding benzol. That gentleman contended that benzol enrichment, in the system adopted by Mr. Yuill, was merely a mechanical mixture. Benzol itself was a mechanical mixture, and it was part of the homogeneous mixture of coal gas—whether it had been imparted to the gas in the retorts directly from cannel, or had been taken from the cannel products and put back into the gas. If it was benzol, it was not in any case a gas. He had found by experiment that this was so. For example, at the time referred to, he had self-enrichment going on; and he had such a serious complaint from his tar distiller as to the poverty of the tar, from want of benzol, that he had to stop it. In fact, he was threatened with the loss of the contract. Mr. Yuill took splint coal, giving 18-candle gas. He considered he was perfectly right; but in the west country there were many managers who were using splint coal alone, and who manufactured a gas of about 22-candle power. He believed there were numbers present who could verify the remark that from west-country splint they could get 10,000 cubic feet of 22-candle gas, always provided that the retorting was properly carried on—that was to say, if the charges were drawn every three-and-a-half or four hours. Another point which had been made was that it was not the benzol that

made the money. Mr. Yuill had given them an enriching value of 0·364d. per candle. That was so; but the great saving was in the coke. If they took a splint coal, yielding only 11 cwt. of coke per ton, and made their gas of 22-candle power, for the 11 cwt. of coke they would get 5s. 6d. But supposing they used benzol, they would get 14 cwt. of coke, which would be 7s., or 1s. 6d. per ton (almost 2d. per 1000 cubic feet) more, for coke alone. Not only so, but they would find that coking coal made a good coke trade. He believed that the sooner they got cannel outside altogether, and could find a good substitute for it, the better. Mr. Yuill made a point of putting in benzol at high pressure. He himself had not tried benzol under such conditions—5 lbs. pressure was what he had used; but he should like to call Mr. Yuill's attention to this, that the temperature was always more easily maintained in a vacuum than under pressure. He could not see any benefit in injecting the benzol at high pressure. His experience of it was that it was equal to a mixture, in common coal, of 23 per cent. of Fife shale and cannel.

Mr. W. Ewing (Greenock) remarked that the subject before them was bristling with interest; and he thought Mr. Yuill was on the right track. Like Mr. Bell, he had had some experience with the Young and Aitken analyzer—about 25 years ago. He was then a boy in the laboratory, and attended there while Mr. Young and Mr. Aitken were making their experiments. These were successful to a certain extent; but there was a great drawback in the deposition of naphthalene, and also of some form of benzene in the meter diaphragms, which gave a good deal of trouble. He was also associated with the analyzer which was erected under Mr. Bell's care; but after that gentleman left the place, extensions were made which did away with it entirely. Under Mr. Bell's charge, marvellous results were obtained from it; but they were, he thought, largely due to the climate, as had been suggested. Mr. Bell had spoken of their going back to the good old times. He knew of a tar-distilling plant which would be in the market very soon, and which would be most suitable for the extraction of benzol, to be used for enrichment. He had carried out experiments with benzol, and on different lines from those followed by Mr. Yuill. He applied the benzol at the outlet of the consumers' meters. A 20-candle gas could be enriched to 48 candles. It was consumed through a No. 000 burner, which was equal to a No. 8 in illuminating effect. The insurance people killed that apparatus. And within something like a year—about 1895—benzol had risen in price from 9d. to, he thought, 4s. 9d. per gallon. Of course, it did not pay to enrich by benzol at that price. There might be a difficulty in that way now; but he was certain that within a year or two they would be in a position to use in enriching gas all the benzol extracted from the tar. It was quite possible, in Scotland, even during a severe winter, to enrich gas to the extent of (say) 3 candles; and in the summer, 6 or 7 candles, or even more.

Mr. A. Waddell (Dunfermline) said he knew of cases where they had to enrich by only 1 or 2 candles; and in such instances there was not much fear of fluctuation in the enrichment. In Scotland, when 4, 5, or 6 candles of enrichment were being added to the gas, it would be different. He did not know of any way of regulating it; and therefore, in Scotland, it was necessary to add the enrichment at the outlet of the holder. A question had been raised as to introducing benzol at a pressure. The pressure, of course, was not after it had met the coal gas at all. After the benzol had passed through the injector, and had met the coal gas, it was not under pressure beyond that of the coal gas. It might be taken that the increased pressure was only useful so far as it helped the diffusion of the vapours in the coal gas. He tried, by means of a 2-inch pipe, to put the vapour of benzol direct into the inlet of the holder; and he was surprised to find that there was no enrichment whatever, though he should have had an immense enrichment, according to the quantity of vapour he was putting in. It appeared to be very much like this: When it entered the inlet of the holder, there was such a quantity of it that, as it were, it overcharged the coal gas just at the point where it met it—overcharged it so much that it just fell through it. He tried, again, to run the liquid benzol into the gas; and he met with no better result. He could pass any amount of liquid benzol into the gas without obtaining one whit of enrichment. It all came back with the tar; and he had no doubt that, as in the case of the vapour, it simply overcharged the gas till it fell out, as water vapour fell out, like a cloud. There was another peculiarity connected with enrichment by benzol, and that was that the vapour was not injected direct into a main pipe or into the holder, but a small quantity—about 14 or 15 parts—of coal gas was taken at the inlet to the holder, and the vapour was put into it, and it, in turn, was put into the large holder. This appeared to him to follow from the same reason—that, if they allowed the vapour to get into the large quantity of gas in the holder, it did not seem to diffuse quickly enough, but to overcharge the gas, and then it simply fell through it.

Mr. Yuill, replying upon the discussion, said he looked upon the last speaker as corroborating what he had said in his paper. In fact, he had done more, because Mr. A. Waddell had had as large an experience in this particular line as he (Mr. Yuill). Mr. Bell had had great experience with oil, not only in gas-works, but in other places; and when he spoke of the Young and Aitken analyzer, they could quite see that they were getting a practical view of the position in which things were—they could understand where the failures were and where the benefits came from. In the atomizer, the whole of the tar was passed through the apparatus. There was in most tars a large percentage of water which, when the heat was raised to boiling-point, was given off as vapour. They had also innumerable compounds of hydrocarbons existing in the gas—amounting, he believed, to hundreds; but those they had to deal with were the light naphthas and the benzols. If they charged naphtha into coal gas under the same conditions as benzol, he would be surprised if they got it to remain permanent, no matter what percentage they put in. There were benzols and benzols. Someone might experiment with 50 per cent. benzol, and might come to them and say it was of no use. He admitted this; but the man might ask himself the question whether he was dealing with a benzol that was capable of entering into combination with coal gas. He said that 50 per cent. benzol would not combine with coal gas; it would be found precipitated in the drip-boxes. But take 90 per cent. benzol, and see that it was as free and pure a toluene as could be got, and it would be found that it had the decided advantage of being a permanent gas. Mr. Bell anticipated that the time would come when perhaps they would go back to the analyzer. He (Mr. Yuill) was glad to learn from Mr. Ewing that they were going to get what he presumed would be a modification of the analyzer, so that they would be able to drive out the benzol from the tar, and put it into the gas. Mr. Bell had also spoken about the fluctuation in the make, and the constant attention which was required in maintaining the illuminating power of the gas. He (Mr. Yuill) could only speak for his own works. At the present time, their make was pretty constant. They knew exactly what they were doing. They had a meter with which to measure the benzol; and they knew the exact quantity of benzol to use. They could then make their calculations for 12 or 24 hours. They knew just how much benzol to put in, per ton of coal used, to give them the required result; and they could depend upon it. Mr. MacPherson had not given them the assistance he expected he would have rendered, because he was afraid of the precipitation of the benzol added to the gas. Now, he (Mr. Yuill) thought, from the remarks he had already made, they would see why some benzols were precipitated from, and others retained in, the gas; and they might take it as a scientific truth that ordinary coal gas would contain, at 0° C. (that was pretty low), more benzol vapour than would give an enriching value of 5 candles. He did not believe anyone there was in a position to say the benzol would be precipitated in a severe Scotch winter, after the investigations that had been made by scientists.

Mr. MacPherson: Will you give me your authority?

Mr. Yuill: If you look in the "Journal of Gas Lighting" during the past few months I think you will see that.

Mr. A. Waddell: I think I can give the name of Mr. Forbes Carpenter, and also, I believe, of Professor Lewes.

Mr. Yuill (continuing) said they might take it that coal gas of 16 candles, and at 0° C., was capable, by added benzol, of being raised in illuminating power by 5 candles, and he did not think any of them required more than 5 candles of enrichment, even with ordinary splint coal. One would almost infer, from what had been said, that there was no depreciation or condensation in the case of gas enriched by cannel or shale; but they had all had experience of this form of enrichment, and most of them knew that there was great depreciation and condensation when using some shales and cannels. Mr. M'Lusky found that this took place even when he was using first-class cannel. If that were so, there would be greater depreciation if they were using shale. Mr. Brodie had referred to the introduction of the benzol under pressure. There was no doubt that they were in a better position to enrich gas when they were able to bring one atom of benzol into contact with its corresponding atom of coal gas. They could never do that by adding the bulk of benzol to the bulk of gas; but where they had the benzol under pressure, and passed it through an injector, the injected matter commingled the better with the gas, and was thus brought into more intimate contact with it. Supposing they took a steam-jet injector, they would be surprised to find that the air was intimately mixed with the watery vapour. Mr. MacPherson, in depreciation of enrichment by benzol, said they would be found throwing it out, as they had done oil gas two or three years ago. He (Mr. Yuill) had had some experience with oil gas, while Mr. MacPherson had not; and, as the result of that experience, he said if benzol were not what it was to-day, he would use oil gas, even at the present price of oil, in preference to coal. Mr. Vass had raised the question of the cost of the apparatus. This, of course, varied according to requirements. The price of the one he had fixed up was £150. It was capable of enriching 100,000 cubic feet of gas 1 candle per 24 hours. If, however, he wished to enrich by 5 candles, then the quantity would be 20,000 cubic feet. One point he had not gone into was the saving effected by using benzol. He was prepared to stand by the figures he had given, and from them they would find that the difference of enriching by cannel and splint and by splint and benzol was as 1s. 5·59d. to 1s. 2·21d.—a difference of 3·38d. per 1000 cubic feet. On his make of 80 million cubic feet, this came to more than £1000. They could judge for themselves, and make their own calculations. Mr. M'Lusky's observations did not, he thought, call for any further remark from him. He had gone into the reasons for benzol being injected. Mr. M'Lusky had come to his assistance by his statement as to depreciation in the case of first-class cannel; and Mr. Ewing had given them some anticipation of what they were to get. In speaking about the price of benzol, of course it was now recognized that it was settled by a ring; but that ring was subsequently broken up.

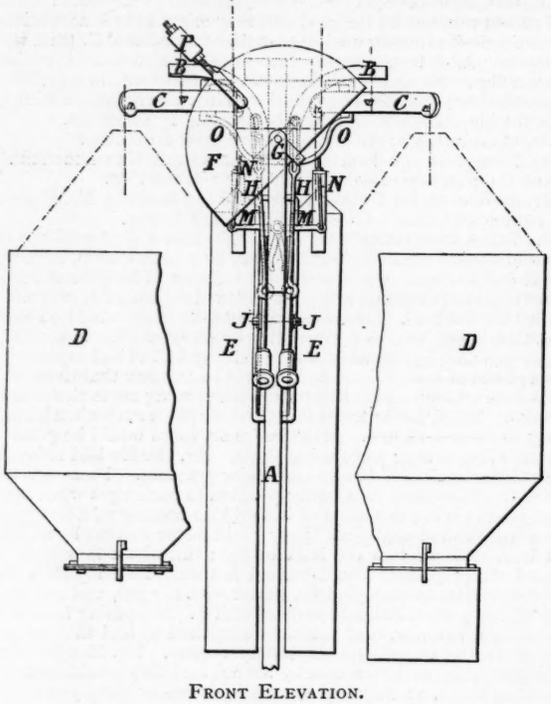
AUTOMATIC COKE-WEIGHING APPARATUS.

By M. Dulac, of Besançon.

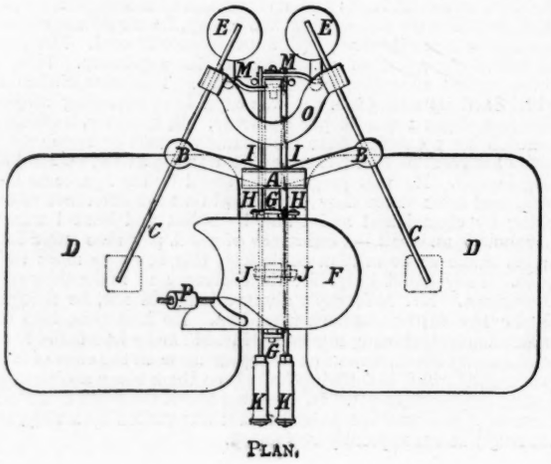
[A Paper read at the Annual Meeting of the Société Technique.]

The apparatus we now bring before you is intended to simplify putting coke into sacks and measuring it. The coke-breaking plant at the Besançon works is made up of five principal parts: (1) Elevator buckets provided with a charging-hopper; (2) a sieve on the A. François system, for the preliminary sifting; (3) a breaker with adjustable shafts; (4) a rotary screen with concentric cylinders of perforated sheets; (5) automatic weighing apparatus. It is to the last that I wish to draw your attention.

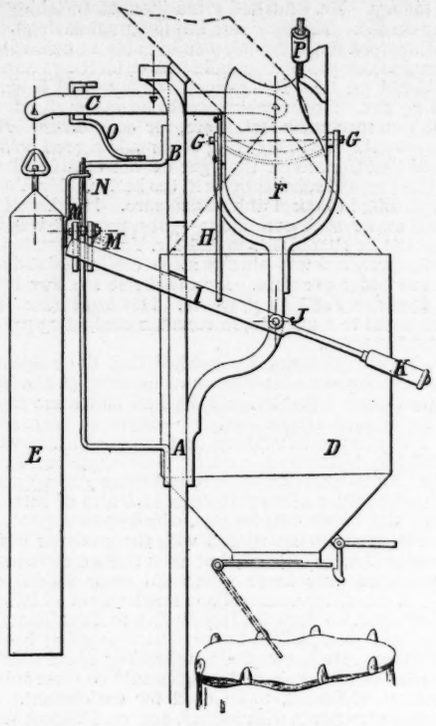
The screen classifies the coke into five kinds: No. 1, No. 0, small, fine, and dust. The first four sorts are carried by shoots, inclined at 45°, to above the four weighing machines. We did not think of having an automatic weighing apparatus for the dust, as the retail sale of it is so small. Each weighing apparatus consists chiefly of a vertical iron support A, ending at its upper part in two curved bars B, to which are hung the beams C of two balances. Each beam carries at one end a sheet-iron skip D, and at the other a cast-iron counter-weight E arranged so as to balance the weight of the skip, *plus* 50 kilos., or 3 qr. 26 lbs. (At Besançon the coke is sold in sacks weighing 50 kilos.) A moveable shoot F, on a horizontal axis G, is arranged so as to receive the coke at the outlet of the fixed shoot inclined at 45°, and to throw it into one skip or another, according to whether it is turned to the right or to the left. This moveable shoot is arranged in such a way that the axis around which it turns may be very near to, but below, its centre of gravity, which is obtained by screwing or unscrewing the little counterweight P. This moveable shoot is fastened by two small connecting-rods H to two straight levers I, working on a horizontal pin J. At one of the ends of these levers is a handle K, and at the other a notch L, which allows them to be thrown into gear with two little bent levers M. The bent levers are themselves fastened by small connecting-rods N to the two counterweights hung on the balance-beams. A bent-down piece of iron O limits the stroke of the last-named.



Front Elevation.



Plan.



Side Elevation.

The apparatus is put together so that the right counterweight throws the large left lever out of gear; and inversely, the left counterweight the right lever. This being so, when a skip has received the 50 kilos., it raises the counterweight, bringing into play the little bent lever, which throws the big one out of gear. This last, in falling, starts, by means of the small connecting-rod, the overturning of the moveable shoot, and the coke is thus directed into another skip; the man having only to empty the one containing the 50 kilos. of coke, and to hook on again the lever which has been thrown out of gear.

For works in which the coke is sold by weight, this apparatus has the advantage of doing away with the source of error arising from differences in the weight of the sacks, which may amount to several kilogrammes when those of esparto are used. In case of rain, if one wants to take into account the moisture of the coke, the foreman has only to add an extra weight to each counterweight, in order to re-establish the correctness of the measurement. Where the coke sales are conducted by the hectolitre (2¾ bushels), the apparatus can be used in the same way. Again, each apparatus can be very easily supplied with a reckoner, which allows of knowing exactly the amount broken each day, and the proportion of each sort.

In summer, this apparatus loses its importance, as a large portion of the daily make of coke is put into store; but during the time of sales, which, moreover, corresponds with the greatest make, it avoids the measuring of nearly all the production, which means a large economy, while giving greater correctness in the figures. With this coke-breaking plant and five men, we prepare, weighed and ready for delivery, about 100 sacks an hour. The handling of the sacks is done on a platform the height of the delivery carts, and so can be wholly effected by small two-wheeled trolleys; thereby enabling us to employ men of a certain age, because they have not to carry the sacks, but only to wheel them on to the trolleys, which is much less onerous. These weighing-machines were made in our workshops, and cost about 200 frs. (£8) each.

A NEW TYPE OF SCRUBBER.

By R. W. B. Creeke.

[A Paper read at the Annual Meeting of the North British Association.*]

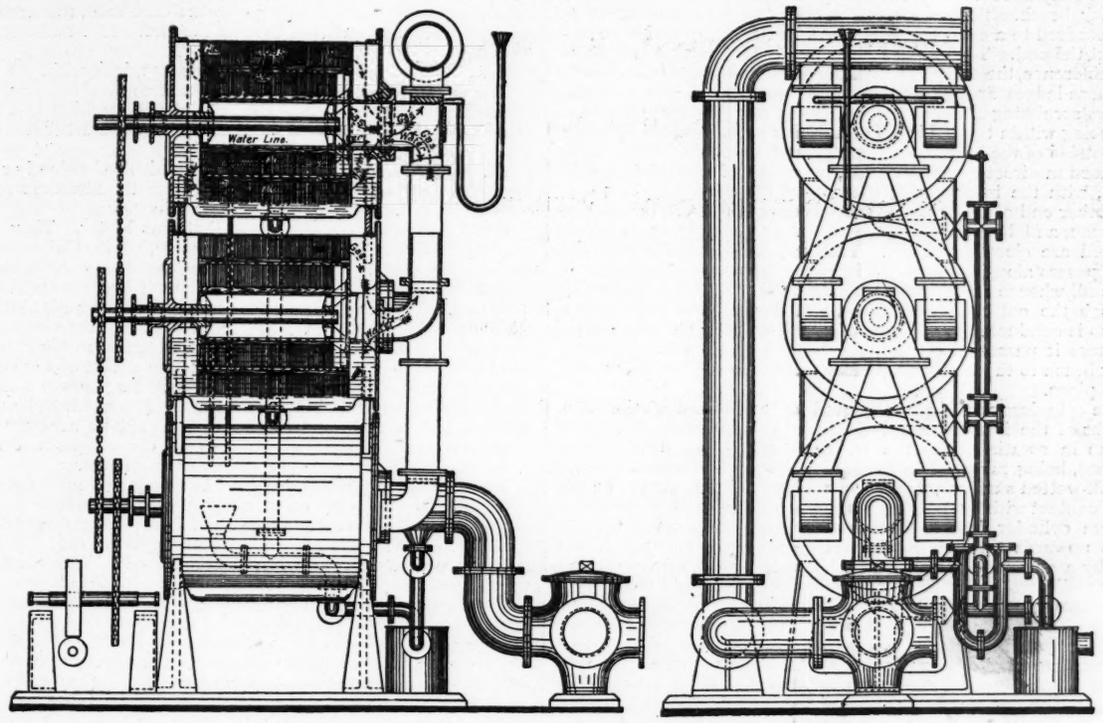
Like other sections of the plant used in modern gas-works, the apparatus employed to effect the abstraction of the ammonia has undergone many alterations, tending to increase its efficiency

* The paper was read by Mr. A. MacPherson, of Kirkcaldy, who explained that he did so on account of the author having recently had the misfortune to lose his eyesight.—Ed. J.G.L.

as well as reduce its cost. It may be of interest to trace, as far as possible, the principal changes that have taken place from time to time, and so altered the scrubber that in its most perfect form it is so unlike its predecessors in shape and construction as to retain little or no resemblance to them, except in the functions it is called upon to perform—namely, to abstract from the crude gas the contaminating ingredients, ammonia, carbonic acid, sulphuretted hydrogen, &c.

It may, however, be necessary, for the purpose of this short paper, to define the essential difference between a scrubber and a washer. In a scrubber, the gas is acted upon by coming into contact with wetted surfaces; whereas in a washer the gas is always passed through the body of the purifying liquid in one way or another. The washer was made use of some time before the scrubber was invented, and there are many instances of early patents for its improvement—viz., Daniel Wilson, 1817, John Hobbins, 1824, &c.

In the first edition of the "Treatise on the Manufacture of Coal Gas," by Mr. Clegg, the younger, published by Messrs. Weale in 1841, no mention is made of any form of scrubber, although at this date the manufacture of gas for lighting purposes was carried on to a considerable extent throughout the country. In "King's Treatise on Coal Gas," it is stated that the prototype of the scrubber was the apparatus constructed by a Mr. Gossage in 1836; but this, although to all intents and purposes a tower scrubber, was used for the decomposition of common salt. I find, however, that previously to this, on Aug. 17, 1835, Mr. Henry Phillips obtained a patent for an apparatus in connection with the purification of illuminating gas by the abstraction of ammonia; the gas being passed through a vessel fitted with trays on which were laid "refuse, tan, twigs, coke, hair, or other such substances, kept wetted with saline solution, dropped down through a perforated plate." Curiously enough, this vessel is recommended to be used after the ordinary purifiers; but it is to all intents and purposes a scrubber. It would also appear that shortly after this scrubbers of some sort were employed, for in 1846 we find that Mr. George Lowe, of London, took out a patent in connection with them for improvements dealing mainly with the apparatus for the distribution of the water. The scrubber so improved consisted of an upright vessel in two sections, containing coke wetted with water and weak liquor, through which the gas was passed. In 1848, Mr. F. C. Hills obtained a patent for a scrubber, and an improvement on this was erected by Messrs. Walker at Blackfriars, London, which seems to have been the first really effective description of scrubber. This was of the tower type, filled with coke, with an improved form of water distributor. Afterwards, Messrs. Walker, in conjunction with Mr. Mann, made considerable improvements in the scrubber. The water-distributing apparatus was driven by steam power. Later on the scrubber was divided throughout its height into several sections, and at the top of each the descending liquor was caught and redistributed, and the efficiency of the apparatus rendered perfect, but at the expense of greatly increased dimensions. Broken bricks or coke have been used from the first for filling the towers; but later on Mr. George Livesey, of London, introduced the timber filling, generally known as "Livesey boards." This class of scrubber, gradually perfected since its first inception in 1835, with various minor modifications in shape and construction, has been generally adopted.



The chief difficulty encountered in the working of the earlier scrubbers was in the arrangements for distributing the water or purifying liquid over the scrubbing material, generally owing to the holes in the distribution-pipes filling up. And the equal saturation of the coke, &c., by this or other usual means, is a matter into which enters so large an element of chance, that it is very doubtful if the whole of the scrubbing material comes into action. In consequence of the many difficulties and defects, attempts have been made by various gas engineers to substitute some form of mechanical or active scrubber for the inert masses of coke, &c., contained in the towers in use.

In 1861, a Mr. Cowper patented an apparatus which consisted of concentric horizontal cylinders of wire gauze revolving in water, in which they were partially immersed, the gas passing from the inner to the outer cylinders. Mr. Whimster, of Perth, devised a rotary exhauster, which, to a certain degree, acted as a scrubber also. Mr. Reid, of the Leith Gas-Works, and Mr. Still, of the Chartered Gas Company, London, constructed vessels in which, by means of rotating blades or buckets, liquid was applied to the passing gas. But none of these machines appear to have been sufficiently effective to cause their further adoption. The two last named were really washers, not scrubbers. It seems to have been reserved for Mr. George Anderson, of London, a Scotsman by birth, to construct the first really effective mechanical scrubber. His patent is dated Aug. 12, 1875, and the scrubber consisted of cylinders formed with wooden staves. On the outside of these staves was secured vegetable fibre, about 5 inches long, suitably arranged. The cylinders or brushes were enclosed in separate cases, rotated mechanically in the purifying liquid, and the gas travelled from the lower to the upper case throughout the series, passing across the brushes and in a direction contrary to that of their rotation. The selection of this fibre was very fortunate, as, besides being practically indestructible through any deleterious action which the gas or water may have upon it, the fibre or bristle form is certainly that best adapted for the purpose, as none of the gas or water can possibly escape its action; and to this fortunate choice of material we are, no doubt, indebted for the progress of the mechanical scrubber.

The action of this scrubber was very successful, and was quickly followed by inventions of a similar class, all adopting the principle of rotating the scrubbing surfaces in liquid, and passing them so wetted through the gas. Notable among these must be mentioned the "Standard" scrubber of Messrs. Kirkham, Hulett, and Chandler, the patents for which were taken out in 1887, and later the scrubber constructed by Messrs. Holmes, of Huddersfield, in both of which the gas circulates in a radial direction through compact discs of scrubbing material rotated on a central shaft; the containing vessel being divided by vertical plates into numerous separate chambers, while the liquid is allowed to flow successively through the chambers in a direction reverse to the passage of the gas. There are other scrubbers of somewhat similar type—namely, the "Eclipse" of Messrs. Clapham Bros., Limited, &c., and one other (a distinctive type), that introduced by Messrs. Walker in 1888, which has a reciprocating action, whereby a series of wooden grids, similar to the well-known Livesey boards, are alternately immersed in liquid and exposed wetted to the passing gas, the boards being arranged in a series of chambers communicating one with the other in a regular sequence.

The result of the various developments and improvements here briefly mentioned has been to change the scrubber from a somewhat crude and exceedingly bulky piece of apparatus to a compact, well-contrived, highly efficient machine, doing its work with certainty. To illustrate this, it may be pointed out that, according to the formula of a well-known gas engineer, to deal with a million cubic feet of gas per diem, tower scrubbers having a cubic capacity of 9000 feet are required; while with an efficient scrubbing machine the cubic capacity need not exceed 560 feet—the comparison being nearly as 17:1 in favour of the latter, and the price reduced by one-half.

In placing before you these few notes, I have not considered it necessary to do more than merely indicate the various forms the scrubber has taken, as their mechanical structure and the general chemical action of all scrubbers, in whatever degree, are fully detailed in the numerous excellent handbooks on the manufacture of coal gas, and any further description from me would be unnecessary. I trust, however, you will now permit me to bring more particularly to your notice a new arrangement of machine scrubber, in the hope that it may be of interest to you.

This scrubber is an advanced type of the brush class of machine. The scrubbing material used is the same as in the original, and now generally considered to be the most suitable for the purpose. It consists of two or more steel cylinders with closed ends, placed horizontally, and arranged one above the other. Each is provided with a gas inlet-port at the centre and one end; while at a lower level, and on either side of the inlet, are provided two outlet-ports. These outlets in the lower cylinder communicate, by means of suitable connecting pipes, with the inlet of the cylinder immediately above. In each cylinder is placed a compound or annular brush. This is formed with a cast-iron ring at either end, secured to a central shaft, which is carried in suitable bearings at the end. These rings have two ledges, one at the outer circumference, the other at a suitable distance towards the centre. On these ledges are secured wood staves, to which are fixed the fibrous scrubbing material; thus forming two cylindrical brushes, one being within the other. The annular space formed between the outside of the inner brush staves and the inside of the outer is placed in direct communication, by means of a circular mouthpiece, with the inlet-port at the end of the containing cylinder The other end of this annular space, between the two brushes, is left open, and both ends of the drum on which the inner brush is fixed are closed gas-tight. The gas, being admitted at the inlet, passes along through the inner annular space, escaping at the end, whence it returns along the surface of the outer brush, through the outer annular space, and down to the outlet-ports, and so is conducted to the inlet of the brush, immediately above it, where it passes along the annular space, and so on, over the outer brush to the outlets, as before, until it finally escapes to the main pipes.

The cylinders are filled with liquid up to the level of the inlet mouths of the inner brushes, which act as overflows, allowing it to run in rotation from the higher to the lower brush. The brushes, being revolved in the liquid, continually supply a series of well-wetted surfaces, which are so brought into the most intimate contact with the passing gas. The foul gas, flowing into the bottom cylinder first, is there met by the strongest liquor, and flows upwards through the various cylinders; being met in the last by a stream of clean water. The brushes are revolved by means of Leys' patent chain gearing; and the lower brush may make two or more revolutions to each revolution of the upper brush. The containing cylinders are made considerably longer than the brushes, so that the gas, at each reversal of direction, expands into a large chamber after each contact with the scrubbing material. A system of pipes with suitable stop-valves is provided, connected to the clearing trough at the bottom of each cylinder, whereby the liquid can be run from the upper to the lower for testing purposes, or entirely run off, as may be required.

Some of the advantages to be derived from this compound or annular system of brushes, contained in separate cylinders, placed one above the other, are: (1) The ease with which any brush section can be stopped and withdrawn for examination or cleaning, while the remaining sections can, with very little delay, be continued in full operation. (2) The large amount of scrubbing surface through which the gas passes in traversing the brushes. (3) The facility given for revolving at varying speeds, allowing, when necessary, the extra scrubbing of the gas in the stronger liquors, and thereby adding to the efficiency of the apparatus in removing carbonic acid, sulphuretted hydrogen, &c., from the gas. (4) The ease with which the capacity of the scrubber can be increased at any time by simply adding an additional cylinder as required.

It is not my purpose to say anything as to the use and action of washers; but I may state that a washer, or, more properly speaking, tar extractor, should be used in connection with, although not necessarily forming a part of, the scrubber. There are two distinct types of washers—viz., (1) That in which the gas is made to pass through water in a series of distinct operations, one passage following the other, and which necessarily causes the pressure to accumulate or increase with each operation. (2) That in which the gas is divided up into several main currents, and so passed, at one operation, through the liquid in many minute streams; thus the pressure need not exceed ½ inch. The second class should, therefore, in all cases be adopted.

I trust, gentlemen, these few notes on one of the very important and essential sections of the apparatus placed under your control may have interested you in some small degree. It had been my wish to have made this paper more complete by placing on record the results of certain experiments which I intended to have carried out, and to have given you an account of the chemical results of the action of the machine I have specially discussed; but I regret I am unable at present to do so. If, however, your Committee will allow me to again trespass on your time at a future meeting of the Association, I hope to have the pleasure of laying before you a record of these experiments and tests, in which I shall have the kind assistance of our fellow-member, Mr. M'Pherson, who has been good enough to undertake the reading of this paper for me.

Discussion.

The PRESIDENT (Mr. W. R. Herring) said he thought they were much indebted to the author for compiling the paper, the earlier part of which was a very complete *résumé* of the various types of purifier which had been devised for washing gas. Of course, the first essential, in the past, was to get something which did not give any trouble. In the earlier days of gas lighting, anything mechanical, as applied to scrubbers, was depreciated. But mechanical science had made strides since then; and they were not so much afraid to adopt devices to do the work, if they accomplished it better and more economically than was previously done in tower scrubbers. At the present day, these appliances seemed to be going out of existence, for the simple reason that scrubbing could be done in much less bulk by means of rotary machines. The scrubbing area was concentrated. Personally, he was an advocate of the brush system, which was originally introduced by Mr. George Anderson; but he thought that, in constructing apparatus of this sort, they must be careful to see that there were no mechanical appliances which could be avoided. It appeared to him that, in the apparatus described, there must be a rubbing face somewhere, dividing the final outlet chamber from the inlet.

Mr. MACPHERSON explained how this was dealt with.

The PRESIDENT said the joint was a large revolving one, upon the tightness of which the efficiency of the machine to a great extent would depend, because if the joint should become leaky foul gas would pass.

Mr. MACPHERSON said Mr. Creeke had devised a gland or stuffing-box to go round. The drawing before the members was his original design.

The PRESIDENT remarked that that was better. They would remember, he said, the Kirkham machine, which had been used for so many years. The defect of that machine was the rubbing surface between the chambers. In time it became untrue, and it was no uncommon thing to find foul gas at the outlet, notwithstanding the quantity of water that was passing through the machine. Then, he thought, Messrs. Holmes, in their type of scrubber with brushes, overcame that one defect of the rubbing surfaces, by the end of the brush simply rubbing upon a distended disc. If this defect had also been removed here, which he understood it had been, then he believed it would be a highly useful apparatus; and what would have to be considered in order to determine its utility would be the question of cost.

Mr. A. WILSON (Dawsholm) said he recognized in this scrubber a very old friend. One of the first jobs he had after completing his apprenticeship was the erection of an Anderson scrubber. At that time it was a distinct advance on anything that was in the market; and he expected great success from it. When it was put up, the tests were certainly very promising; but it did not continue to work well very long. The machine became blocked up, through no defect of its own. They found out afterwards that the condensing plant was very deficient, and he had no doubt, to this day, that Anderson's brush scrubber suffered very materially from the want of condensing power at these particular works. They had learned something since then, and several people had taken advantage of Mr. Anderson's foresight, with the result that they now had a great many scrubbers on the market. He thought that with this new arrangement they might perhaps expect a little more advance than they had had, as there seemed to be such a large amount of scrubbing area on a small space. The remark the President had made about the chance of leakage at the ends referred to something which would certainly have to be guarded against. It was a point he was noticing as well; but if it were guarded against, he thought that in this machine they had a very effective apparatus, and something which would do good work. There seemed to be a point there which would be of great help to them, in raising the strength of the liquor, and also, in that way, using less water, as well as doing more effective work for the purifiers. In arranging the speeds of the brushes, he considered it would be a great benefit if those at the bottom were run at a higher speed. In some scrubbers he had had to do with, the quantity of water necessary for complete purification made a large amount of liquor. In certain cases it was arranged that the liquor was pumped from the bottom, and then run through again. This helped purification very much, by keeping the stronger liquor in the bottom and enabling more carbonic acid and sulphuretted hydrogen to be taken out. Perhaps with this apparatus it might not be necessary to pump the liquor over again, if they could increase the speed of the brushes, which he believed could very well be done. He certainly thought, from the appearance of the machine, that it was going to be a very effective one, and he should be interested to learn the results obtained.

Mr. D. VASS (Airdrie) said he failed to follow, in the diagrams, how the brushes were to be withdrawn for repair.

Mr. MACPHERSON said, of course, they must use the bye-pass

whenever they were taking out or putting in brushes. If no one else had any remark to make, he might say that he had such confidence in the machine that he had ordered one to deal with a million cubic feet of gas per day; and he had no doubt it would give him the utmost satisfaction. With regard to the observations of the President and Mr. Wilson, as to the ends being a trouble, he had no hesitation in saying that they would be perfectly tight. The revolving part at the entrance end would be turned out, just like any other journal. The liquor passed over it, and it would be always kept moist. Lubricating material would never be able to get hard; and the stuffing could be examined at any time, in the same way that they could examine any other gland. With respect to Mr. Wilson's remarks about the original Anderson scrubber, he might say he was one of the first to erect one of them, and it gave him the utmost satisfaction for a period of about fifteen years. He only parted with it because it was too small; and during the whole of the time he had no trouble with it whatever. There was no blocking, or anything like that. Of course, he had a tar extractor below it. He knew it was in operation to this day in the works of a small company, and doing good duty —the original brushes, and everything else. It must therefore have been for want of sufficient condensation that there was any failure in the case of the one to which Mr. Wilson referred.

AUTOMATIC ENRICHMENT OF GAS BY BENZOL.

By M. Lacaze, of Paris.

[A Paper read at the Annual Meeting of the Société Technique.]

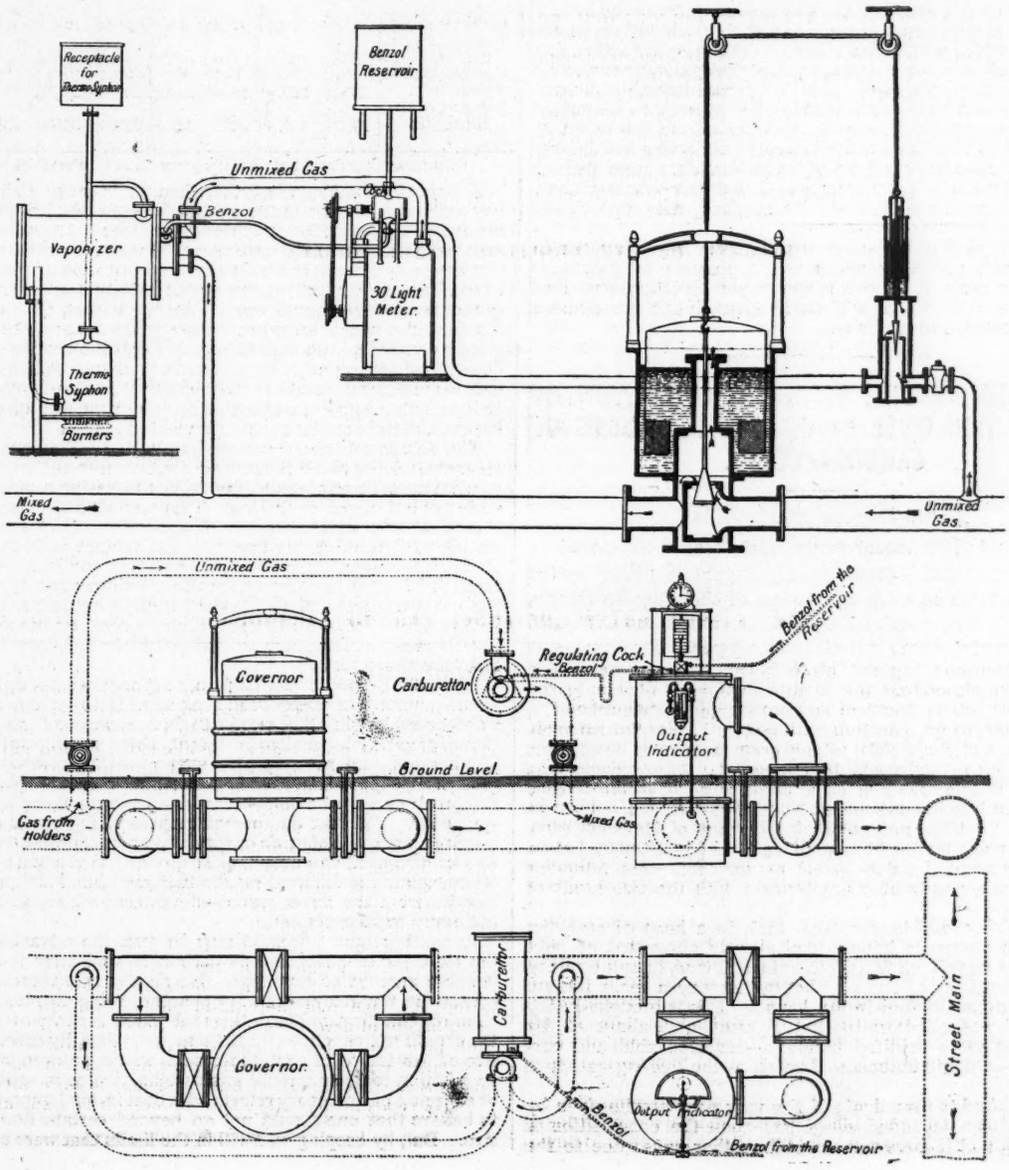
Carburetting gas with benzol is becoming more general, and numerous applications have been made for some years; the data which have been furnished by Dr. Bunte being taken as the basis of work. He considered it was requisite to add to a gas having an illuminating power of about the regular standard, 4 grammes per cubic metre, to bring down the gas consumption 1 litre (0·035 cubic foot) per hour with the standard burner of 1 carcel.

Experiments, made in the first instance at the Dessau works, demonstrated that the quantities indicated by Dr. Bunte were too great; and since then, according to trials made in a good number of French works, it is found that, according to the benzol employed and the lighting power of the gas, 1 gramme to 1·6 grammes is needed per cubic metre for an enrichment of 1 litre. But we must take into account the methods employed to add the estimated quantity of benzol to the gas to obtain the required illuminating power. I shall not speak of the process employed in certain works, where it is considered sufficient to pour cold benzol on to surfaces over which the gas passes; for I do not think this method offers any guarantee. However, I shall investigate the two following cases, in which the benzol must be vaporized and added in the state of vapour: To the gas (1) at the time of manufacture, and (2) at the time it is sent out.

In these two cases, we must know both the lighting power of the gas and the quantity to be carburetted. The latter varies every instant, and one can appreciate the difficulty in feeding the vaporizer without being obliged to continually make tests of the output; and even then we may take it for granted that there is no guarantee that this output has not varied during the experiment itself. The *desideratum* would be to have an appliance to regulate the supply of benzol in proportion to the quantity of gas to be carburetted.

This first point decided, we have nothing to consider but the amount of benzol to be employed per cubic metre, which could be determined by a simple photometric test to ascertain the average illuminating power of the gas. If carburetting is done after the gas has left the station meter, it naturally follows that we must obtain from the meter itself, which turns proportionally to the quantity of gas manufactured, a movement which will work the apparatus conveying the required amount of benzol to the vaporizer. I recommend carburetting the gas at the outlet, and submit the two following methods of doing it.

1.—The benzol-feeding apparatus is worked by the output



regulator. This device, shown in the illustration, comprises a conical cock governed by the bell of the output regulator. If the sections of the cone of the regulator and of the cone of the cock are in the proportion of 1 to 10, we can readily understand that, the pressure being the same at the inlets of these two appliances as at the gasholder, 1-10th of the total delivery will pass by the cock and 9-10ths by the regulator. The amount of gas passing by the cock goes through a meter, which, by means of a chain, works a measuring-cock which will supply the vaporizer with the quantity of gas in proportion to the gas measured by the meter. By means of a set of pulleys of fixed diameter, the exact specified percentage of benzol can be conveyed per revolution of the meter drum. After leaving the meter, the gas crosses the vaporizer, where it becomes charged with benzol vapours, and returns to the emission-pipe, where it mixes with the other non-carburetted gas. By furnishing the meter with a dial, 1-10th of the amount of gas emitted will be recorded, and consequently the total emission will be known. By consulting the hands of the dial at regular intervals, the requirements at all specified hours can be ascertained.

2.—The benzol-feeding apparatus is governed by an instantaneous delivery indicator. The bell apparatus represented in the illustration is placed on the pipe. The bell being perforated with holes 4 millimetres (0·16 inch) in diameter, and weighted to 5 millimetres (0·2 inch) of water, the number of holes or the height of the bell emerging from the water will be proportional to the volume of gas delivered. If by aid of the connecting-rods shown in the illustration the motions of this bell are transmitted to a slide-valve, the sections of the orifices uncovered by the valve will be proportional to the volume of gas passing through the delivery recorder. The benzol reaching the distributor with the slide-valve under constant pressure will find its way to the vaporizer in proportions variable with the output. The vaporizer receives gas directly from the gasholder. After being charged with benzol vapours, the gas mixes with the gas from the emission regulator a little in advance of the delivery recorder, through which consequently all the gas emitted will pass. An indicator sliding along a suitably graduated scale will indicate every moment the quantity of gas consumed. To vary the quantity of benzol according to the lighting power of the gas, ascertained by a photometric test, which should be made to determine its value, the width of the orifice over which the slide-valve glides, governed by the delivery recorder, can be regulated by a micrometric screw. This screw should be regulated once a day, as soon as the photometric test has shown the number of litres of gas consumed to give the light of a carcel, and consequently the volume of benzol required per cubic metre of gas delivered to obtain the carcel for 105 litres (3·6 cubic feet), for example. This screw once regulated, the delivery recorder will indicate automatically the proportion of benzol required for the gas emitted.

The two methods which are now submitted to you appear to supply a want, and they will make it possible to guarantee automatically a regular illuminating power of the gas without fear of excess of benzol at a given moment, if the gas emitted suddenly decreased in quantity.

INFLUENCE OF THE PHYSICAL CONDITION OF COAL ON THE QUALITY OF THE PRODUCTS OF CARBONIZATION.

By M. Verdier, of Marseilles.

[A Paper read at the Annual Meeting of the Société Technique.]

We have thought it of interest to investigate what influence the physical condition of coal, at the time of charging the retorts, might have on the course of carbonization, and to see if it would not be of value to use the material in some particular form, so as to effect its better utilization. For this purpose we experimented with a retort in one of the regenerative arches of the works, the outlet-pipe of which retort was connected to experimental works, including condensers, purifiers, and meter. A special arrangement allowed of constantly taking away a sample of the gas proportionate to that made in the retort. This sample was collected in a little holder of 1500 litres (53 cubic feet) capacity. The tests were carried out on two kinds of coal, both coming from Newcastle. Coal No. 1 contained 44 per cent. of small material, passing through a sieve of 1 centimetre (over $\frac{3}{8}$ inch), placed at an angle of 45°; coal No. 2 contained 53 per cent. The following table gives the results of charges made with the two kinds of coals.

—	Coal No. 1.		Coal No. 2.	
	In Bulk.	Small only.	In Bulk.	Small only.
Volatile matter, per cent.	31·50	29·50	29·90	27·70
Ash, per cent.	6·50	7·71	6·48	7·01
Make of gas in cubic metres per 100 kilos.	30·50	26·20	31·10	28·80
Quality of gas in litres per carcel	101·32	112·93	101·63	110·34
Yield of carcels per 100 kilos. of coal	301·00	232·00	306·00	261·00
Analysis of the Gas.				
Carbonic acid	1·[illegible]	2·70	1·35	2·10
Illuminating hydrocarbons	3·30	2·90	3·50	2·95
Carbonic oxide	6·30	6·00	6·95	7·27
Hydrogen	53·00	53·49	54·77	55·30
Methane and nitrogen	35·50	33·10	33·60	32·50

This verifies a well-known fact—that, in a heap of coal, the small pieces represent injured coal, partly composed of split portions separated from the big lumps; and that, in addition, the real organic matter of the coal had undergone a more intense oxidation by the air than in the lumps. This is brought out by the low make of gas from the small pieces, and, above all, by their holding more oxidized products—carbonic acid, and carbonic oxide—the bad influence of which on the lighting quality is well known.

But we wished to investigate if the very poor results given by the small pieces depended altogether upon the composition of the material, and if there was not still another cause due to the condition of size of the coal used for carbonizing. To this end, the following tests were made: Taking the biggest lumps from the heaps of coal Nos. 1 and 2, they were broken and arranged into four classes: (1) Big pieces, from 1 to 3 kilos. (2·2 to 6·6 lbs.) each. (2) Average pieces, from about 50 to 100 grammes ($1\frac{3}{4}$ to $3\frac{1}{2}$ oz.). (3) Small coal passed through the same sieve as for that already experimented upon. (4) Very fine dust. These samples were only prepared a few moments before the time for charging. We were also very careful only to have to deal with one and the same material, and that the differences, if any arose, should only be caused by the size of the coal. The results are shown in the following table.

—	Coal No. 1.				Coal No. 2.			
	Large.	Medium.	Small.	Dust.	Large.	Medium.	Small.	Dust.
Make of gas*	32·80	32·60	32·30	31·50	33·20	33·00	32·20	31·40
Quality of gas†	100·92	104·48	110·99	117·53	101·81	102·48	107·69	119·39
Yield of carcels‡	325·00	312·00	291·00	268·00	330·80	322·60	298·30	263·50
Analysis of Gas.								
Carbonic acid	0·92	0·95	1·10	1·05	0·90	0·90	1·10	1·00
Illumin. hydrocarbons	3·85	3·65	3·20	2·85	3·61	3·27	2·70	2·45
Carbonic oxide	6·63	6·83	6·90	6·90	6·72	6·27	6·90	6·80
Hydrogen	53·20	53·70	54·10	54·90	54·60	53·35	56·10	56·65
Methane and Nitrogen	35·30	34·70	34·50	33·60	33·91	34·04	33·16	33·15

* Cubic metres per 100 kilos. † Litres per carcel. ‡ Per 100 kilos. of coal.

The results obtained show, therefore, that for one and the same kind of coal it is not a matter of indifference whether it be used for carbonization under one form or another. An explanation of these facts is sufficiently intricate; and without wishing to affirm anything definite, we are led to believe that it is only a question of conductivity, and of greater or less facility in the transmission of the heat in the mass at work. We see, in fact, that, within the limits of size which have been experimented upon, the make of gas only varies a little with the condition of the coal for the same charge and the same duration of carbonization. It is understood that the temperature of the arch was kept as regular as possible. It is only the lighting quality of the gas that was considerably lowered, and, in consequence, the yield in carcels.

The differences, as the gas analyses which are given also show, refer exclusively to the illuminating hydrocarbons, the proportion of which is reduced considerably, while the methane and hydrogen undergo but slight variations. This consideration leads us to think that the principal cause of the reduction in the yield of carcels of the coal treated may be the contact with the coke in formation, which the carbonized products would have to pass through in order to escape from the mass—a contact, moreover, the more complete when the coal used is smaller and smaller. Independently of these theoretical considerations, some interesting conclusions, from a practical point of view, may be drawn from the above tests.

First of all, there is good reason, as is seen, to specify distinctly in the purchase of unscreened coal, what is to be understood by "unscreened;" in other words, to fix a maximum for the proportion of small coal. As has been seen, these small pieces existing in a heap of coal not only give unfavourable results because of their state of smallness, but also cause great inconvenience while in store, by being of a character which lends itself to depreciation by the air. The test on the "proportion of the small coal" has its place marked alongside of the tests on volatile matter and ash. In fact, the great variations in this proportion of small coal would often explain the different results that are obtained from various cargoes from the same source—differences which, at times, are not easily to be explained.

In another line of thought may be seen the advantage it is to the manager of gas-works to carbonize coal after the slightest possible amount of breakage. He should not, therefore, exaggerate the tendency which is apparent, owing to means of mechanical charging, to break the coal which is more or less large. He should not conclude from these tests that, by increasing the size of the lumps of coal, the results would be even still better. In addition to the practical impossibility, which is soon reached, of charging our ordinary retorts with coal in big lumps, we are led to believe that one should not go beyond certain limits in their size. But, by keeping well within the limits that were used in the

tests quoted—that is to say, within the extreme limits of practice with existing retorts, from lumps of 2 to 3 kilos. (4·4 to 6·6 lbs.) to fine dust—we have seen that the reduction in the yield of carcels follows a law, very consistent in its action, according to the size of the pieces.

The tests were made, as stated at the outset, with Newcastle coals; but we are led to believe that the results noted do not apply solely to this quality of coal, and that the conclusions drawn are equally applicable to gas coals from any other source.

COMPOSITION, EXAMINATION, AND APPLICATION OF BENZOLS.

Recent numbers of "Chemische Industrie" contained articles on the above subject by Dr. F. Frank. The following abstract thereof appears in the current number of the "Journal of the Society of Chemical Industry."

The reduction in the prices of benzol since 1882 is shown in the following table, which also gives the German imports (from England and Belgium) and exports:—

	Marks per 100 Kilos.		Marks per 100 Kilos
1882	175—400	1896	50—120
1885	50—90	1897	65
1890	100—125	1898	25
1892	40—60	1899	20
1895	25—60	1900	20

Year.	Imports.	Exports.
1891	7,316	516
1892	5,683	916
1895	8,317	1,966
1896	11,305	1,539
1897	10,135	1,270
1898	5,915	1,611
1899	5,291	2,755

At the present time, Germany produces upwards of 28,000 tons of benzol annually, of which at least 22,000 tons are consumed in the colour works; the remainder being used for the enrichment of gas and other purposes. The fall in prices was accompanied by the demand for a purer product; stress being laid on freedom from paraffins, light hydrocarbons, carbon bisulphide, and from thiophen.

The ordinary method of testing benzols, by observing the volume of distillate obtained at certain temperatures, is no guarantee as to their true character. For example, although the following mixtures fulfil the requirements of 90 per cent. benzol, only the last can be regarded as a typical 90 per cent. benzol:—

(1) 82·0 p. ct. benzol + 18·0 per cent. toluol,
(2) 92·2 p. ct. benzol + 7·8 per cent. xylol,
(3) 90·0 p. ct. benzol + 5·0 p. ct. toluol + 5 xylol,
(4) 84·0 p. ct. benzol + 13·0 p. ct. toluol + 3 xylol.

Solvent Naphtha.—The strength usually claimed is 90 per cent. at 160° C.; but it is pointed out that it would be better to limit the end-point of the distillation to 150° C., so as to exclude coumarone and indene, and thereby improve both odour and stability to light. Another type of solvent naphtha, consisting chiefly of cumol, and yielding 90 per cent. of distillate between 140° and 175° C., is obtained by washing heavy naphtha with sulphuric acid and distilling with live steam.

For the proximate composition of commercial benzols as used in colour works, Kraemer and Spilker give the following data:—

—	90 per Cent. Benzol.	50 per Cent. Benzol.	0 per Cent. Benzol.
	Per Cent.	Per Cent.	Per Cent.
Water	0·050	..	..
Paraffin	0·100	0·25	0·50
Carbon bisulphide	0·686	0·39	..
Substances absorbing bromine, including thiophen and the like	1·202	1·23	0·82
Thiophen *per se*	0·264		
Benzene	80·922	45·37	13·54
Toluene	14·850	40·32	73·42
Xylene	2·180	12·44	11·69

With regard to the examination of benzols, it is stated that, with but few exceptions, the ordinary retort method, with the thermometer immersed in the liquid, has been replaced by the following system: The distilling vessel is a globular copper still of 150 c.c. capacity, the bottom being flattened as shown in fig. 1. It is 66 mm. in diameter, and 0·6 to 0·7 mm. thick. The neck is 25 mm. long, 20 mm. wide at the bottom, and 22 mm. wide at the top. The glass still-head (see fig. 2) is 150 mm. long and 14 mm. wide, with a globular enlargement in the centre, and, 10 mm. above this, a side tube, 8 mm. wide, branching off almost at a right angle. The still rests on an asbestos disc with a circular hole 50 mm. in diameter, and is heated by a colourless flame of a bunsen burner. The burner is surrounded by a metal cylinder with four holes, 10 mm. from the top, for the escape of the products of combustion. The Liebig condenser is 800 mm. long, and inclined at such an angle

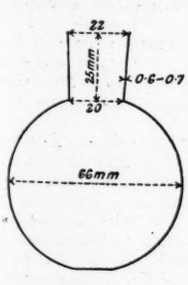


FIG. 1.

that the outlet is 100 mm. lower than the inlet. The charge is 100 c.c., and the rate of distillation 5 c.c. per minute (2 drops per second); the operation being finished when 95 per cent. has passed over. The thermometer is made of thin glass about half the thickness of the diameter of the still-head; the mercury bulb being fixed in the centre of the globular enlargement. It is graduated to tenths of a degree for pure products, and to half-a-degree for commercial benzols; and it should be tested occasionally against a Government standard. The variations in barometric pressure are allowed for by making the necessary corrections, or they may be disregarded by employing a thermometer with an adjustable scale, and distilling 100 c.c. of pure water through the apparatus, fixing the 100° C. point the moment that 60 c.c. have passed over. The complete apparatus is shown in fig. 2.

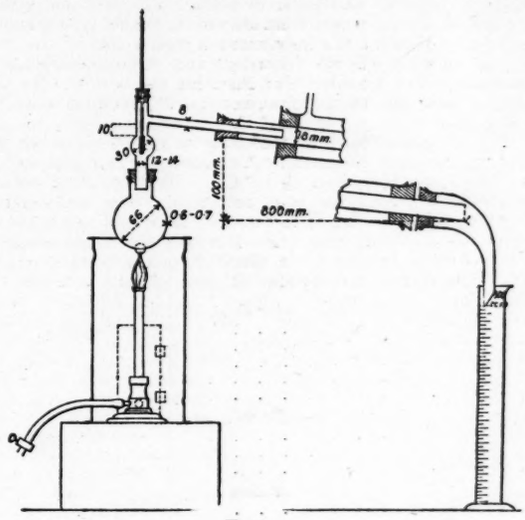


FIG. 2.

The following figures give the average specific gravities of commercial benzols:—

90 per cent. benzol	0·880—0·883
50 per cent. benzol	0·875—0·877
0 per cent. benzol	0·870—0·872
Solvent naphtha, 90 per cent. at 160° C.	0·874—0·880
Solvent naphtha, 90 per cent. at 175° C.	0·890—0·910
Heavy naphtha	0·920—0·945
Pure benzene	0·883—0·885
Toluene	0·870—0·871
Xylene	0·867—0·869

The estimation of carbon bisulphide is effected in the following manner: 50 grammes of benzol are mixed with 50 grammes of a solution of potash (11 grammes) in absolute alcohol (90 c.c.), and kept at the ordinary temperature for a few hours. The mixture is then shaken up with 100 c.c. of water, the aqueous solution is separated from the benzol, and the washing operation repeated three or four times. The potassium xanthate is determined in the washings by acidifying with acetic acid and titrating with a solution of copper sulphate obtained by dissolving 12·475 grammes of the crystallized salt in a litre of water, 1 c.c. = 0·0076 CS_2. The end-reaction is ascertained by the red colour produced when a drop of the liquid, taken out with a glass rod, is brought into contact with a drop of a solution of potassium ferrocyanide on a filter-paper. Ninety per cent. benzol contains 0·2 to 1 per cent., and 50 per cent. benzol up to 0·5 per cent. of carbon bisulphide. Thiophen can be detected by the indophenine test (blue colour). For its quantitative estimation, the method proposed by Denigès is recommended, which depends on the formation of the compound $SO_4(HgO)_2 : Hg . SC_4H_4$, by acting upon thiophen with mercuric sulphate.

For the quantitative estimation of paraffins, 200 grammes of the benzol under examination are thoroughly mixed for 15 minutes in a separating funnel with 500 grammes of fuming sulphuric acid (20 per cent. anhydride), taking care to avoid heating. The mixture is allowed to stand for two hours; the sulphuric acid solution being then drawn off, and the treatment with fuming sulphuric acid repeated a second and third time. The residual paraffins are then separated, while the portion which is dissolved in the acid is recovered by diluting the acid with three volumes of ice water, and distilling the solution in a flask of three litres capacity until, in addition to oil, 50 c.c. of water have passed over. The distillate, after separating the water, is added to the original oil, and the mixture treated several times with fuming sulphuric acid (30 grammes) until its volume ceases to diminish. The quantity of paraffin in 90, 50, and 0 per cent. benzols seldom exceeds 1 per cent. Toluol is mostly free from this impurity; while xylol frequently contains as much as 3 per cent.

To ascertain the presence of unsaturated compounds, 5 c.c. are shaken vigorously for 5 minutes with 5 c.c. of strong sulphuric acid in a stoppered bottle holding 15 c.c., and the coloration, if any, is compared with a solution of potassium bichromate in sulphuric acid (50 per cent.). The coloration imparted to 90 and 50 per cent. benzol should not exceed the colour of a bichromate

solution containing at the most 2·5 grammes of $K_2Cr_2O_7$ in 1 litre of sulphuric acid, while pure products should remain colourless.

For the purpose of determining the bromine absorption, 5 c.c. of benzol are mixed in a stoppered glass cylinder of 50 c.c. capacity, with 10 c.c. of dilute sulphuric acid (20 per cent.). A decinormal solution of potassium bromide and bromate (9·9167 grammes of KBr + 2·7833 grammes of $KBrO_3$ per litre, 1 c.c. = 0·008 gramme Br) is then added from a burette until, at the end of five minutes' continuous shaking, there is a permanent coloration, and the oil gives a blue colour to freshly prepared zinc iodide starch paper. The amount of bromine assimilated by 90 and 50 per cent. benzol is usually 0·6 per cent., and rarely exceeds 1 per cent.

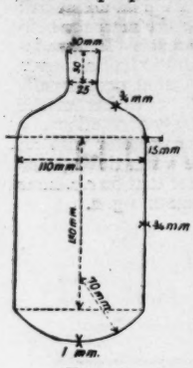


FIG. 3.

The following are the mean flashing points of benzols: Pure benzol, − 8° C.; 90 per cent. benzol, under − 4° C.; toluol, + 5° C.; xylol, + 21° C.; solvent naphtha (90 per cent. at 160° C.), + 21° C.; do. (90 per cent. at 175° C.), + 28° C.; and heavy benzol, + 47° C.

The percentage composition of commercial benzols is ascertained by distilling 1 kilo. of the sample in a copper vessel, as shown in fig. 3, fitted with a Le Bel-Henniger dephlegmator 60 centimetres in length. The distillate is collected in tared bottles. It is divided into the following fractions:—

For 90 and 50 per Cent. Benzol.

Up to 79° C.	First runnings.
79° to 85°	Benzol.
85° to 105°	Intermediate fraction.
105° to 115°	Toluol.
Residue	Xylol.

For Toluol.

Up to 109° C.	First runnings.
109° to 110·5°	Toluol.
Residue	Last runnings.

For Pure Benzol.

Up to 79° C.	First runnings.
79° to 81°	Benzol.
Residue	Last runnings.

For Xylol.

Up to 135° C.	First runnings.
135° to 137°	Paraxylol.
137° to 140°	Metaxylol.
140° to 145°	Orthoxylol.
Residue	Last runnings.

Percentage Composition.

	90 per Cent. Benzol.	50 per Cent. Benzol.
First runnings	1·0	0·3
Benzol	78·8	18·3
Intermediate fraction	10·0	47·5
Toluol	8·0	23·7
Xylol	2·0	10·0
Loss by distillation	0·2	0·2

Pure Benzol.

First runnings	0·5
Benzol	98·0
Last runnings	1·2
Loss by distillation	0·3

Toluol.

First runnings	0·3
Toluol	97·3
Last runnings	2·2
Loss by distillation	0·2

Xylol.

First runnings	1·3
p-Xylol	15·0
m-Xylol	76·5
o-Xylol	5·0
Last runnings	2·0
Loss by distillation	0·2

REGISTER OF PATENTS.

Incandescence Gas-Mantles.—Bloxam, A. G.; (a communication from Phlox-Glühlicht-Gesellschaft, mit beschränkter Haftung, of Heidelberg, Germany). No. 15,030; Aug. 22, 1900.

Tyndall (the patentees remark) has shown that the coefficient of emission of a substance for heat rays is proportional to the coefficient of absorption of the same substance; and Kirchoff has shown the same fact for light rays. So that it is true for both kinds of rays that the best radiators are the best absorbers. Among substances to which this generalization applies, must undoubtedly be included the particular earths, thoria and ceria, which constitute incandescence gas-mantles. These are good radiators, and therefore also good absorbers. If, now, it were possible to make such mantles better absorbers of the heat supplied to them without changing any other of their specific properties—such as increasing their heat conductivity—they would become better radiators, and a larger proportion of the heat supplied to them would be emitted as light.

The present invention relates to the manufacture of incandescence mantles by which the object thus set forth is accomplished to a considerable extent. It is based, in the first place, on the observation that a body like a metal wire assumes the temperature of a flame into which it is introduced, the more quickly and to a higher degree the smaller its mass. It was concluded that the same would be true of bodies composed of metal oxides—like the well-known mixture of thoria and ceria—in the form of wires, threads, fabrics, and the like. So that this observation might be the key to the problem. This is not, however, unconditionally the case, but only when the proportion between the thoria and ceria is varied from that fixed at the present time as the proper proportion, and indeed "according to a law discovered" by the patentees—namely, that the light emitted by incandescent threads or fabrics of thoria-ceria mixture reaches a maximum, and is at the same time more lasting when the percentage of ceria in such threads or fabrics is increased in the same proportion that the mass of such threads or fabrics is diminished.

It is accepted at the present time that the mixture of 99 per cent. of thoria with 1 per cent. of ceria is the composition which gives the most light; and it is regarded as settled that a deviation from this proportion in either direction diminishes the light. It could not be foreseen from these properties of the mixture of oxides in the known proportion, that—for increasing the light emission while diminishing the mass—there must be a change of composition in the sense of the law set forth above.

An ordinary normal incandescence mantle of about 30 mm. diameter weighs about 600 m.gms., and contains, for white light, 1 per cent., or 6 m gms., of ceria. If, according to this invention, the weight of the mantle is diminished from 600 m.gms. to (say) 350 m.gms., the percentage of ceria must be increased to $\frac{600}{350} \times 1 = 1{\cdot}72$ m.gms.

When the weight of an incandescence mantle of a given size is diminished while the usual fabric is used, the separate threads of the illuminating oxide are thinner, and a large part of the light-emitting surface is lost in consequence. Thus the necessary surface which is diminished by the small dimensions of the separate threads must be obtained by adding to the number of the threads. This is best effected by increasing the usual number of meshes in the fabric used.

Generally speaking, the manufacture of this new incandescence mantle is similar to that of the old—that is to say, by impregnating the fabric with a solution containing salts of the illuminating oxides, drying, burning off, and igniting.

An incandescence gas-mantle manufactured according to this invention, of normal size, weighing when burnt 380 m.gms., and having some 70 meshes per sq. cm., gives, with an ordinary gas consumption of 115 to 120 litres per hour, and at a pressure of 34 mm. of water, a light equivalent to 120 to 130 Hefner candles, as compared with 80 to 90 Hefner candles obtained from an ordinary mantle heated under similar conditions. Thus this new mantle requires 0·9 to 1 litre of gas per hour per Hefner candle, as against 1·4 to 1·5 litres required by the ordinary mantle.

It is not practicable to diminish the mass of the common thoria-ceria mantle, because the strength of the thin, brittle threads of earth would be too much prejudiced thereby, and such a mantle would be destroyed by the smallest external influence. The necessary reduction of mass without disadvantageous effect on the strength of the mantle may, however, be secured as follows.

It is known that the very brittle incandescence mantles made from the so-called illuminating earths may be strengthened by silica; but by the addition of a large proportion of silica, the candle power of the mantle is considerably reduced, while a small proportion has but little strengthening effect. Furthermore, incandescence mantles containing silica fall in, and contract, after incandescence for a short time, and assume a dense, conical form. The separate threads are so strongly "sintered" that they become very brittle, and are easily broken in lighting the burner. This deformation depresses the light emission of the mantle very much. The other sintering oxides—such as alumina, magnesia, beryllium oxide, and titanic oxide—have a deteriorating effect on the mantle like that of silica.

Mantles made according to this invention are free from sintering. The sintering oxides destroy the voluminous character of the thoria on which the emissive power of the mantle depends. If, however, a cotton fabric is impregnated in the usual manner with a solution of thorium and cerium nitrates containing dialyzed silicic acid and ammonium nitrate, then dried, burnt off, and treated to incandescence in the gas blow-pipe flame, there is obtained a strong mantle of high and lasting emissive property. For example, 10 grammes of the usual solution containing about 33 per cent. of mixed thorium and cerium nitrates are mixed with 1 c.c. of a dialyzed solution containing 1·6 grammes of silica per 100 c.c., and with 0·5 gramme of purest ammonium nitrate. Mantles are manufactured with this solution in the usual manner.

The ammonium nitrate counteracts the sintering of the silica by the vapour which it evolves in its decomposition by heat. Thus the mantle is strengthened by the silica, but prevented from deterioration in emissive property by the ammonium nitrate.

Since ammonium nitrate is decomposed into nitrous oxide and water even at 200° C., it is completely expelled during the incandescence of the mantle in the gas blow-pipe flame. Nevertheless, it imparts to the silica mantle the desired properties.

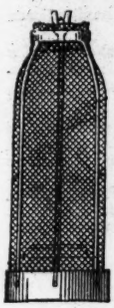
Any organic or inorganic substance which, when heated, volatilizes or is decomposed into volatile products, may be substituted for ammonium nitrate for the purpose in question. The following materials may be named as examples among the many that may be used: (1) Ammonium chloride. (2) Ammonium sulphate. (3) Aniline nitrate. (4) Picric acid. (5) Pyrogallol. (6) Glycerine. (7) Cane sugar. (8) Dextrin. Substances like oxalic acid, which would cause a precipitate in the thorium or cerium solution, must be applied to the fabric either before or after impregnation, or even after burning off.

The substances may also be used in mixture and combination with each other, and the silica may be added to the impregnating solution in the form of a compound of silicon with an organic radical, which compound must not, however, be of such a nature that it decomposes with loss of its organic component when the mantle is merely dried. In such a case, the organic matter having been dispersed before the mantle is burnt off, the effect intended to be produced thereby during the burning off would be lost. Thus only those organic silicon compounds are applicable of which the organic radical is not volatile on drying. The best of these is glyceryl silicate. The silicon compounds which decompose on drying can only be employed in conjunction with

another compound, like ammonium nitrate, or one of those already given as equivalent thereto. For the silica may be substituted any other substance which (like silica) effects a strong sintering of the illuminating oxides. Such are alumina, beryllium oxide, and magnesia.

From what has been stated, it will be seen that this invention is applied by: (1) Using a fabric having a larger number of meshes per unit area than has the fabric commonly employed; (2) Choosing a concentration of the impregnating liquid such that the mantle shall have a smaller weight than usual; and (3) Increasing the content of cerium correspondingly with the diminution of weight of the mantle.

The following example is an illustration of the invention: There are dissolved in 274 grammes of water, 45 grammes of thorium nitrate, 0·95 gramme of cerium nitrate, and 20 grammes of ammonium nitrate; and to the solution are added 11·2 grammes of a solution of silica obtained by dialysis, and containing 2 per cent. by weight of silica (SiO_2). A cylindrically-knitted fabric of the yarn commercially known as No. 100, containing 120 meshes in every turn of the knitting and 5 turns per centimetre of the length of the cylinder, is impregnated with the solution prepared as above prescribed, dried, burnt off, and heated to incandescence.



Incandescent Gas-Burners.—Gluth, C., of Hamburg. No. 22,088; Dec. 5, 1900.

The patentee proposes to provide beneath the suspending loop at the top end of incandescent mantles a ring made of asbestos, thin wire, or other suitable material. Vertical ribs (preferably of the same material as the ring) start from the latter in any desired suitable number, running along the external surface of the mantle. They are inter-connected at their bottom end by a ring, which surrounds the bottom end of the mantle.

Incandescent Gas-Lamps.—Nicholls, R., of Brighton. No. 18,321; Dec. 10, 1900.

A narrow band of wire or other gauze A projects about ⅛ inch above the point of ignition in the burner, and situated between the mantle and the flame. The base of the mantle is thus protected from the intense action of the gas. The pyramidal form of the flame is changed by means of a fire-clay deflector E. The deflector first opens the flame so that it may play on the mantle from the base to the top, and then traps the partially consumed gas and perfectly burns it, "thereby preventing pollution of the atmosphere and any collection of carbon on the top of the mantle." Further, "by promoting the consumption of the whole of the carbon, the flame is fed and becomes denser, reflecting more light, and conserving more heat, still further aiding combustion." The intense heat thus stored up by the deflector, it is said, "very much assists the incandescence of the mantle, especially at the top, and regulates the otherwise too sudden cooling of the top of the mantle, which is very destructive to it, in the case of mantles employed in street lighting or exposed places."

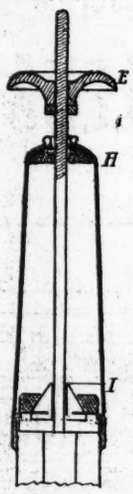


FIG. 1.

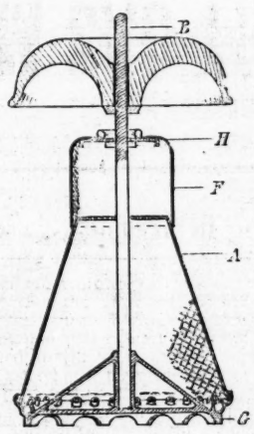


FIG. 2.

The deflector (fig. 1) is supported by a rod, which projects sufficiently to form a rest for the deflector. The disc H supports the mantle. This may be made of wire gauze or any suitable material. The rod rests upon, and within, the conical part I of the burner. In length it is about 4½ inches by about ⅛ inch thick, with a thread cut on it for about 2½ inches from the top.

Fig. 2 (very similar in construction to fig. 1) is employed for heating purposes "where a subdued light or glow only is required, and perfect combustion is demanded." Here, A is an extended piece of wire gauze, which meets the mantle at F, about 2 inches below H. The mantle is consequently much shorter, as heat (not light) is required in this case. It rests upon the burner G, as in fig. 1. The support B is held in place by the cone, as in fig. 1. The deflector and mantle are supported as in fig. 1, and subject to all the conditions described as to materials and construction. The deflector is hollowed out and domed at the top, of a consistency of ⅜ inch thick, with a hole large enough for the support B to pass through.

The salary of Mr. E. Onions, the Corporation Gas Engineer of Loughborough, has been advanced from £300 to £350.

CORRESPONDENCE.

[We are not responsible for opinions expressed by correspondents.]

Standardizing Meter Indices.

SIR,—I notice that the question of standardizing meter-unions is being discussed by the various Gas Associations. May I suggest to those interested that they might with considerable advantage enlarge the scope of their inquiry? Some twenty years ago, in a pamphlet issued by me to the various gas authorities, I called attention to what I considered was a very great difficulty in the Sales of Gas Act—*i.e.*, the liability to error in the indices of meters. Under that Act it is not requisite that the wheels of the indices should be tested in any way, and there have been numerous instances where wrong indices have been used. Now, by standardizing the indices, and using the type of index illustrated in the pamphlet referred to, mistakes would practically be impossible. The index is now public property, uncovered by any patent, though at the time I had protected it.

Manchester, Aug. 1, 1901. THOS. G. MARSH.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following further progress has been made with Bills:—

Bill reported with amendments: Derby Corporation Bill.

Bills read the third time and passed: Aldeburgh Corporation (Water) Bill, Cromer Water Bill, Ilkeston and Heanor Water Board Bill, Mond Gas Bill, Shipley Improvement Bill.

HOUSE OF COMMONS.

The following further progress has been made with Bills:—

Bill read a second time and committed: Burgh Sewerage, Drainage, and Water Supply (Scotland) Bill.

Lords Bills read the third time and passed: Arlesey Gas Bill, Barrow-in-Furness Corporation Bill, Broadstairs and St. Peter's Water and Improvement Bill, Dover Corporation Bill, Harrogate Water Bill, Heywood and Middleton Water Board Bill, Leeds Corporation (General Powers) Bill, Newport (Isle of Wight) Gas Bill, Ripon Corporation Bill, Rugby Water and Improvement Bill, Salford Corporation Bill, Smethwick Corporation Bill, South Essex Water Bill.

HOUSE OF LORDS COMMITTEE.

Wednesday, July 24.

(*Before the Duke of* NORTHUMBERLAND, *Chairman*, *Lord* BRAYE, *Lord* WROTTESLEY, *Lord* MUNSTER, *and Lord* BANDON.)

LONDON UNITED TRAMWAYS BILL—ELECTROLYSIS OF GAS AND WATER MAINS.

The Bill promoted by the London United Tramways Company for extending their system to Richmond, Surbiton, and East Molesey, which has already been passed by the House of Commons (*ante*, pp. 35, 94), came to-day before the above-named Committee of the House of Lords.

Mr. BALFOUR BROWNE, K.C., Mr. J. D. FITZGERALD, K.C., and Mr. LEWIS COWARD, K.C., appeared for the promoters. The petitioners were represented as follows: Chelsea Water-Works Company, by Mr. PEMBER, K.C, Mr. CLAUDE BAGGALLAY, K.C., and Mr. F. W. PEMBER; Heston and Isleworth District Council, by Mr. MORTEN SMITH; owners and frontagers in Kew Road, Richmond, by Mr. A. P. VAN NECK; Middlesex County Council, by Lord ROBERT CECIL, K.C., and Mr. EARLE; owners, &c., in Broadway and Bridge Road, Hammersmith, by Lord ROBERT CECIL, K.C.; and the Richmond Corporation, by Mr. LITTLER, K.C., and Mr. MOON.

The CHAIRMAN said he had been unaware, when he consented to sit on the Committee, that one of the parties was the Heston and Isleworth District Council. He was a proprietor in the district; and though he was not in any way biassed in the matter, some people might object to his being connected with the inquiry.

Mr. BALFOUR BROWNE pointed out that Heston and Isleworth were not opposing. He then stated the objects of the Bill, and proceeded to speak at some length on the opposition of the Chelsea Water Company. He took a preliminary objection to the Company's *locus standi*. Having explained their point as to electrolysis, which they anticipated as a consequence of difference in potential at the two ends of the proposed lines, he pointed out that the whole question of electrolysis had been considered by the Committee over which Lord Cross presided. It was felt then that, if electric tramways were to be made at all, their construction must be rendered comparatively cheap. For this reason, a copper electric return, though the most effective for gathering up the overflow of electricity and preventing its doing any damage, was regarded as prohibitive. The Committee recommended that electric traction companies should be allowed to have the use of the roads, under certain conditions. These conditions were embodied in clause 12 of the London United Tramways Act of 1899. It was the revised model clause drawn up by Lord Cross's Committee, and was incorporated with the present Bill by clause 21. Sub-section 2 of the model clause said: "The Company shall take all reasonable precautions in constructing, placing, and maintaining their electric lines and circuits, and other works of all descriptions, and also in working their

undertaking so as not injuriously to affect by fusion or electrolytic action any gas or water pipes or other metallic pipes, structures, or substances, or to interfere with the working of any wire, line, or apparatus from time to time used for the purpose of transmitting electrical power or of telegraphic, telephonic, or electric signalling communication, or the currents in such wire, line, or apparatus." The promoters were only protected from an action at common law if they did damage by using the best method of preventing electrolytic action or fusion. According to a decision of Lord Blackburne, no action would lie for doing that which the Legislature had authorized, if it were done without negligence, although it might do damage to someone. The promoters were under stringent liability in sub-section 3 of the model clause—viz., "The electrical power shall be used only in accordance with the Board of Trade regulations; and in such regulations provisions shall be made for preventing fusion or injurious electrolytic action of or on gas or water pipes or other metallic pipes, structures, or substances, and for minimizing, as far as is reasonably practicable, injurious interference with the electric wires, lines, and apparatus of other parties and the currents therein, whether such lines do or do not use the earth as a return." Sub-section 4 said: "The Company shall be deemed to take all reasonable precautions . . . if, and so long as, they adopt and employ at the option of the Company either such insulated returns or such uninsulated metallic returns of low resistance, and such other means of preventing injurious interference . . . as may be prescribed by the Board of Trade regulations; and in prescribing such means, the Board shall have regard to the expense involved, and to the effect thereof upon the commercial prospects of the undertaking." The Water Company wanted something more than this, and the promoters objected to give it to them; contending that in clause 38, which dealt with the issue of regulations by the Board of Trade, the Company and the public had ample protection. In the Sheffield case, owing to himself and Mr. Baggallay not having made things sufficiently clear to the Committee presided over by Lord Newton, special protection had been given to the Water Company. It had also been granted in another instance. But it had been refused in others; and on the Bexley Tramway Bill this year, the matter was thoroughly discussed. Before that Committee, the late Sir Courtenay Boyle, giving evidence, said it had been urged that the regulations of the Board of Trade were not sufficient. He went on: "We waited to have instances brought under our notice—proved instances of actual damage occurring. I should like to complete what I have said, in order that I may not appear as taking a side in this controversy at all. I should like to say this—that the gas and water companies are in a somewhat different position from a telephone or telegraphic company. They are innocent users of the earth." Then Mr. J. D. Fitzgerald asked Sir Courtenay: "Is it not quite open to the Board of Trade to alter their regulations at any time, if it is shown to them that they are defective in any particulars?" The answer was: "Certainly; we can alter our regulations at any time, and have done it." In the result, Mr. Seale Haynes's Committee refused a compensation clause, saying that the Water Company must be content with the general clause. The learned Counsel maintained that there was no reason for altering the common law; that the Water Company were amply protected; and that they had no *locus standi* to appear in opposition to the Bill.

Mr. BAGGALLAY said Mr. Balfour Browne was not accurate in stating that it was left to the Board of Trade to decide whether or not the Company should use insulated or uninsulated returns; and he denied, further, that if the Board of Trade made fresh regulations they would operate retrospectively. If insulated returns had to be substituted for uninsulated returns, it would mean that the whole system would have to be altered, and the original capital expenditure would be wasted. Clause 38, to which reference had been made, did not touch this matter at all. All that dealt with this point was contained in section 12 of the Act of 1899, which gave the promoters power to employ either insulated returns or uninsulated metallic returns of low resistance. Then in the second sub-clause it was provided that the Company should take all reasonable precautions in constructing and maintaining their electric lines and circuits and other works, and in operating their undertaking so as not to injuriously affect, by fusion or electrolytic action, pipes, mains, &c. But assuming that they did take all reasonable precautions, the case for the petitioners was that, unless they had insulated returns, sooner or later there must be electrolytic action. The object of the evidence he wished to lay before the Committee was to show that, in the absence of insulated returns, effective protection could not be given to the Companies. Mr. Balfour Browne said the Board of Trade had power to put insulated returns upon the promoters. On this point of law, he (Mr. Baggallay) joined issue.

The CHAIRMAN: That is almost the same question as whether the Board of Trade regulations are retrospective.

Mr. BAGGALLAY said it was not quite the same. Sub-section 7 of section 12 of the London United Tramways Act of 1899 negatived the whole of Mr. Balfour Browne's argument, because, if the Board of Trade had the power to require insulated returns, there was no necessity to insert in the sub-section a special provision that the Board of Trade could require the use of insulated returns in the event of a Department of the Government asking for such protection. This clause was known as the "Observatory clause." Counsel then dealt at length with the preceding cases in which the question of electrolytic affection had been raised. When the present Bill was before the House of Commons, the parties went very fully into the same subject; and, in replying on the case, Mr. Balfour Browne, taking as he (Mr. Baggallay) thought a wrong view on the point of law, really led the Committee to decide against the Water Companies, for he said that the Board of Trade had absolute power to compel the Tramway Company to adopt insulated returns at a future date, even if they had started with uninsulated returns. Counsel was proceeding to quote the evidence of the late Sir Courtenay Boyle, when,

The CHAIRMAN (interposing) said: I do not think, Mr. Baggallay, we need detain you any longer. We are convinced as to your *locus*.

Mr. BAGGALLAY: I believe there is a short cut in this matter. My friend asserted in the other House that the Board of Trade have power to insist on insulated returns. I doubt that. If my friend is prepared to insert words in the clause which shall make it clear that the Board of Trade have power to do it, I will say no more.

Mr. BALFOUR BROWNE: I do not think it is at all necessary. My view is that the Board of Trade have the power.

Mr. BAGGALLAY: Will you make it clear?

Mr. BALFOUR BROWNE: No. I am sure your Lordships will not give a direction to the Board of Trade. I will leave the clause as it stands. I am not going to alter the clause settled by Lord Cross's Committee.

The CHAIRMAN: Then we must go on.

Evidence was then called with regard to the general tramway proposals of the Bill; it being arranged that the question of electrolysis should be raised later.

Friday, July 26.

The case for the opponents having been submitted,

Mr. FITZGERALD rose to reply, whereupon

The CHAIRMAN asked what had become of the case of the Chelsea Water Company.

Mr. FITZGERALD said that it was settled, a clause having been agreed to.

Subsequently the Committee passed the preamble of the Bill, so far as it related to the tramway in Surrey from Hampton Wick and Hampton to East Molesey, Thames Ditton, Surbiton, Malden, &c.; and the following clause was inserted:—

Clause 24A.—The powers of the Board of Trade under section 38 of the London United Tramways Act, 1898, and section 12 of the London United Tramways Act, 1899, as incorporated with this Act, shall be deemed to include power, subject to the provisions of those sections, to make regulations requiring the Company to use such reasonable precautions, including insulated returns, as the Board of Trade may think necessary for the purposes of the said section 12; and the Board of Trade may, in like manner, from time to time alter any such regulations.

LEGAL INTELLIGENCE.

HIGH COURT OF JUSTICE—CHANCERY DIVISION.

Thursday, July 25.

(*Before Mr. Justice* COZENS-HARDY.)

Wath-upon-Dearne Urban District Council v. Dearne Valley Water-Works Company.

In this case, the plaintiffs sought an injunction restraining the defendants from using throttle valves, or other artificial means, to diminish the pressure at which water had been hitherto supplied.

Mr. EVE, K.C., and Mr. MACSWINNEY appeared for the plaintiffs; Mr. MACMORRAN, K.C., and Mr. A. R. GLEN represented the defendants.

Mr. EVE said the plaintiffs were the Urban District Council for Wath-upon-Dearne, in Yorkshire, and they supplied the district with water. Prior to 1898, there were in existence two Companies dealing in water in this locality—the West Melton Company and the Dearne Valley Company. In 1879 and 1880, when the latter Company were in Parliament, it became necessary for them to make with the West Melton Company an agreement, which was afterwards embodied in the Act applied for. The plaintiffs claimed to have water delivered at a particular place under pressure; and the real point at issue was whether the defendants were under any legal obligation to so supply it at this spot, or whether it was competent for them to merely deliver it there without any pressure behind it, leaving the plaintiffs to pump it up so as to distribute it over their district. Since 1879, the water had been delivered at a certain point at a pressure of at least 300 feet head, which was sufficient to enable the plaintiffs to send it over the greater portion of their area of supply. In consequence of the development of the district, however, it would be necessary to carry the water to a greater height, which would require an additional pressure of 50 feet. The point at which the water was delivered had been fixed by the Act, and it was outside the plaintiffs' district. In the agreement of 1879, an obligation was put upon the defendants to deliver water at a pressure of 300 feet. But in the agreement of 1880, which was embodied in the Act, this clause did not occur. One side said it had been left out inadvertently; while the other said it had been done advisedly. By section 9, it was provided (*inter alia*) that the Council should take the ordinary supply of water at 6d. per 1000 gallons, but any water which they required at a greater elevation than 300 feet at 7d. per 1000 gallons; that they should give 48 hours' notice of any contemplated increase in the quantity proposed to be taken, and 12 hours' notice of any suggested decrease; and that the Water Company should supply water in bulk at the point at which it was then supplied, and that the Council should not construct any further works, for the purpose of obtaining an additional supply of water, than those belonging to the Company at the date of the agreement; and that the Company should have power to lay mains through the town. A demand having been made for a further supply, the Company took up the position that they were not bound to give it under pressure. He submitted that they were, and that the burden of distributing it was upon the Council.

Mr. MACMORRAN argued that the plaintiffs were trying to read into the section cited words which were not there. There was nothing about pressure in the Act. The only obligation on the Company was to supply water in bulk, which they could do by turning it into a reservoir at the defined point; and there was an obligation on the Council to take the water.

Justice COZENS-HARDY said the section was a most obscure one, and certainly did not reflect credit upon the draftsman The Company were bound to supply water, and the Council to take it; but the words "in bulk" were not to be found in sub-section 1. If the Council required water at a greater pressure, the Act provided for an additional charge. Sub-section 4 imposed an obligation on the Company to supply water in bulk at the point at which it was now supplied; but nothing was said about "pressure." He thought the Company were not bound to deliver at any particular pressure; and therefore the action would be dismissed, with costs.

Cost of a Leakage of Gas.

A case of interest to users of hired gas-stoves was heard at the South-Western Police Court on Friday. Mr. R. C. Saunders, of Cheriton Square, Balham, was summoned by the South Metropolitan Gas Company for £9 2s. 9d. due for gas supplied. Defendant contested the claim, on the ground that, through the negligence of the Company, a leakage in one of the pipes caused an excessive output to the extent of upwards of £2. The pipe was fitted to a gas-stove which stood in the drawing-room. Mr. Underwood, the Company's representative, pointed out that the stove was the property of the defendant. The latter, however, said it was the Company's. Mr. Underwood said the defendant paid rent for it. The Magistrate explained that the stove and pipes in the house were within the control of the consumer, the responsibility of the Company ending when they supplied the gas to the meter. He could not accept defendant's plea, and made an order for the payment of the amount claimed.

Water Supply to Boarding-Houses.

A case of some interest to the suppliers of water at seaside resorts was heard at Yarmouth on Monday last week. It was a summons against the Water Company, issued at the instance of Mr. John Pidgeon, who is the occupier of Redenhall House, a large boarding establishment on the Drive. His complaint was that the defendants had refused to serve him with water on the usual terms, on the ground that it was really required for business purposes, for which payment is at a higher rate. Complainant had not been without water, as an arrangement had been made to supply him without prejudice; but it was desired that the point should be finally determined. Mr. Low, who appeared for the complainant, said that, according to his rental, he should be charged 12s. 6d. per quarter; but the Company stipulated that this should be the minimum, taken at 5000 gallons, and all water used in excess of that quantity should be paid for at the rate of 2s. 6d. per 1000 gallons. But what a domestic service was had never been decided. It had, however, been held that a workhouse was entitled to a domestic service, because Lord Coleridge said, in the carrying on of what was a public purpose, there was also a domestic use. In 1891, in the case of the Hotel Metropole, it was held that the St. Martin's Vestry were bound to remove clinker refuse from the boiler used for heating, on the ground that this was produced by coal used for a domestic purpose. So Mr. Low argued that, though a business might be carried on in a boarding-house, the water supplied was only used for ordinary domestic purposes—for sanitary uses, cleaning the house, drinking, &c. In the case of a block of offices, where a boiler was used for heating purposes, and to provide hot water, it was held that this was a domestic use. The proper criterion, he argued, should be to what use was the water put—not what were the premises on which the water was used. He failed to see in this matter any difference between a boarding-house and the ordinary lodging-house, or even a doctor's or dentist's house, where a good deal of water was used in minor operations. Mr. Pidgeon having given evidence, Mr. Gregory, for the Company, said their position was that, where a business was carried on in a house, the domestic service must be disconnected from that taken for business purposes. If a consumer took water from the same service-pipe for domestic and business purposes, the Company required that he should pay by meter. The object was not additional income or increased profit, but to check waste; and the principle applied throughout England. Many Yarmouth boarding-houses already took water by meter. Carrying on an hotel was a business; and he submitted a boarding-house was in a similar position. The cases quoted by Mr. Low did not apply, because in this case the water was not wanted for the owner or occupier. Only part of it was for domestic consumption; and the rest was practically sold to complainant's customers. That constituted a user for profit; and in this matter a boarding-house was in the same position as an hotel. The Chairman said the Magistrates' conclusion was that the supply to Redenhall House was a supply for business purposes; and therefore they dismissed the summons. They would state a case if Mr. Low desired. Mr. Gregory refrained from asking for costs.

Substantial Fines for Wasting Water.

At the Barnard Castle Police Court last Wednesday, Henry Robinson Bayles, an ironmonger, was summoned by the District Council for wasting the town's water through suffering a cistern to be out of repair. A fine of £2 and costs was imposed. At the King's Heath (Birmingham) Police Court on the same day, Henrietta Shaw, of Selly Park, was fined 20s. and costs for using Corporation water other than for domestic purposes, on July 19 and 22. Mr. Mellor prosecuted for the Water Department, and it was stated that inspectors of the Corporation on both occasions found a hose-pipe laid in a bed of peas and among the raspberry canes.

At the Lambeth Police Court last Tuesday, Percy Friend, a jobmaster, of Rathgar Road, Loughborough Junction, answered, on three summonses, the complaint of the Lambeth Water Company that he, being a person supplied with water by them, did unlawfully, wilfully, or negligently cause or suffer a pipe or other apparatus to be out of repair, or to be used or contrived so that the water was or was likely to be wasted. Mr. A. H. Bodkin, in support of the summonses, said that the defendant had upon his premises a cistern resting upon the ground. Immediately over the cistern was a leaden pipe to which was attached an ordinary tap. The tap was cut off from the pipe, and then, on the cut end of the leaden pipe, which communicated with the main, an india-rubber hose was affixed. As the water passed through the pipe at the rate of something like 400 gallons per hour, the tank filled very rapidly, and the water then overflowed and ran to waste. The defendant had been twice warned by the Company's inspectors. Evidence having been given in support of the summonses, Mr. Hopkins ordered the defendant to pay a fine of £5 upon each, and £5 5s. costs —£20 5s. in all—or, in default of distress, two months imprisonment.

The Lowestoft High Lighthouse is about to be fitted with the Kitson incandescent oil light.

MISCELLANEOUS NEWS.

THE GASLIGHT AND COKE COMPANY.

The Half-Yearly Ordinary General Meeting of this Company was held last Friday at the Offices, Horseferry Road, Westminster—Colonel W. T. Makins (the Governor) in the chair.

The Secretary (Mr. J. W. Field) read the notice convening the meeting, and the seal of the Company was affixed to the register of proprietors.

The Governor: I presume you will take the report as read, in the usual way; and that being so, I beg to move the adoption of it. I will, as usual, make the report the text of my speech. The first paragraph states shortly that, although we have not, owing to the very exceptional conditions which have prevailed, earned the full amount of our statutory dividend of £4 8s. per cent. per annum by the amount of £123,576, the Directors, in view of the fact that at the beginning of the year the Company had the very handsome balance of undivided profits of £221,570, have no hesitation in recommending the payment of a dividend for the past half year of £2 4s. per cent. on the ordinary stock. As to this payment, I shall have something to say later on. Though our income from the sale of gas shows the large increase of £192,532, this is wholly due to the increase in the price; for there has been a decrease of just over 4 per cent. in the quantity of gas sold, and I am disposed to put in the forefront, as one of the reasons for this, the substantial addition of 6d. per 1000 cubic feet to the price of gas which the increase in the cost of coal compelled us to make at Midsummer last year. Similar increases were made by the other Metropolitan Companies. The Commercial Company raised their price by 6d. at Lady-day; and the South Metropolitan raised their price by 3d. at Lady-day, and a further 4d. at Midsummer. It is quite true that increases or decreases in price, though small, have little, if any, effect upon the consumption of gas by the public. But when an increase is made which represents nearly half a million sterling a year in our district, it must necessarily induce our customers to economize—more especially when you consider that this increase in the price of gas coincided with other serious calls upon the pockets of the public in connection with the war and in the household coal trade. Moreover, the proverbial fogs of London seem to be practically things of the past; and there can be no doubt the Metropolitan Gas Companies are entitled to a very large share of the credit for this amelioration of the conditions of life in London, by the extended use of gas-stoves both for heating and cooking, which effects a considerable abatement in the smoke nuisance, and is largely due to the facilities the Companies have offered to the public. I am glad to acknowledge that the public appreciate daily more and more the advantage of gas-stoves. The saving in labour effected by their use is, in these days, when the domestic servant problem is more urgent, of greater importance than ever; and the advantages of cooking by gas are prominently brought before the public by means of an almost continuous course of popular lectures on the subject. Notwithstanding the temporary increase in the price of gas, the number of gas-stoves during the past twelve months is but little short of the average in any previous years; and I feel assured that, through this method of burning gas, the business of the Company is being placed on a firmer basis than hitherto. There is another valuable agent which is actively assisting the gas interests. I refer to the system of incandescent gas lighting, both for public and private consumers. We all know how rapidly this system is extending, both in private houses and public institutions; and it is most satisfactory to find that the local authorities are also becoming more and more interested in the system for street lighting—and this notwithstanding that the purveyors of electric light are so urgent in claiming to be the suppliers of the only cheap street light. In connection with this matter, I will, for the information, and in the interests, of the public, state shortly what has recently been done in the district of the City of Westminster which until last year was known as the parish of St. George, Hanover Square. The cost of lighting the streets of the parish by gas was, at the price of 2s. 8d. per 1000 cubic feet (the present price is only 2s. 5d.), £10,590 a year; but the Vestry became strangely attracted by the alleged superiority and cheapness of the electric light, and at almost the last meeting before it was absorbed into the City of Westminster, the proposal of a local Electric Light Company for the street lighting of the parish was agreed to, and a contract was subsequently entered into between the parties. Under this contract, the charge for electric lights already fitted, and for a further number to be fitted up, will be £19,000 per annum. Add to this the charge for those gas-lamps which may be allowed to remain, £2500, and you have a total of £21,500, or £11,000 a year more than the cost of gas. But this is not all. The contract into which the Vestry have entered with the Electric Light Company provides that the arrangement shall continue for 31 years. If we multiply the annual extra cost of the electric light by 31, the result is the figure of £343,000. This is apparently the value which the St. George's Vestry place upon the advantages of their new system of lighting as compared with gas; and this sum will have to be met by an addition to the rates. As large ratepayers in the district, this is a serious matter for this Company, because, on the basis of the assessment of our property in the parish, we shall have to bear our proportion. I am not quite sure that we are not the largest ratepayers in the parish. This, to my mind, is seething the kid in its mother's milk with a vengeance. I should add that, for a very slight increase in the amount paid, the parish could have had the incandescent light applied to every lamp, and the streets would have been better lighted than by the electric lamps now proposed. I have given the facts and figures in this case, which I think should make other local authorities pause before following the example of Hanover Square. But to return to the revenue account. The past half year has had to bear the full burden of dear coal. The increased cost as shown by the accounts has been £326,500; but

owing to a small re-arrangement of charges for the manufacture of carburetted water gas, our coal account has been relieved of sundry items of wages, &c., which it has hitherto included. The actual increase in the cost of coal has been £347,739. Unfortunately, the price of residuals has not only not similarly increased—for our receipts on this head are actually less by £36,158 than in June, 1900, and our net coal shows an increase of £383,897, which, taking into account the reduced gas sales, means an additional cost for gas making, on this one item alone, of 8¾d. per 1000 cubic feet. You will recollect that, in anticipation of this additional burden, we had raised the price of gas by 6d. per 1000 cubic feet. But it is not only in the case of coal we have to report additional cost. In purification again we have an increase, and wear and tear is very considerably more—partly the effect of dearer materials and labour, and partly of work and special repair and reconstruction which has been in hand for the past twelve months, and which will for some time to come add materially to the item of repairs and maintenance of works. This expenditure is, however, already bearing fruit in a reduction of the carbonizing wages, which is partly the result of the substitution of inclined retorts for horizontal retorts; and the extension of machine stoking has also effected a saving in the same direction. There has been a further considerable reduction in expenditure under the head of distribution, principally the result of our having to put a limit to the extension of our automatic meter supplies. We have been obliged to adopt this course owing to the action of Parliament in refusing to give us the capital necessary to carry on the business of the Company with the same liberality which has hitherto governed their actions. We have not wholly discontinued the use of automatic meters and stoves; but we feel compelled to restrict the issue within the limits of the Company's resources. The Company are, in this matter, precisely in the same position as the Government would be were the House of Commons, on the ground of alleged mismanagement in the War Office or Admiralty, to refuse the supplies necessary for the proper maintenance of the Army or Navy. Unfortunately for us and kindred companies, no such restriction is placed upon the expenditure of the local authorities, who can obtain, by means of loans secured on the rates, whatever money they require. We have once more to record an increase in the item of rates and taxes equal to an addition of nearly ½d. per 1000 cubic feet of gas. Not only have the assessments gone up, but the rates per pound are now 3d. heavier than they were in June, 1900. I will now deal with the important matter of ways and means, which is the subject of the fourth paragraph of the report. As the shareholders are aware, we have for some time past been carrying on our business with insufficient working capital; and this financial pressure has been very severely felt since the rise in the price of coal last year. In October we offered for sale £125,000 of ordinary stock at par, of which unfortunately £38,190 was left on our hands. We have a further £125,000 to place—that is, in all £163,190—and until this is taken up, we are precluded from issuing the balance of our debenture stock, £130,550. So that we have capital powers amounting to about £280,000 which are rendered unavailable by the provision in our Act which, for purposes of sale, fixes par as the minimum price to be placed on the ordinary stock. The Directors have arrived at the conclusion that a final effort must be made by the Company to issue this ordinary stock. The shareholders not having taken up the stock at par, the Directors have had under consideration a suggestion made by a first-class firm in the City for securing, by underwriting or some other means, the placing of the stock, while strictly conforming to the provisions of the statute as to the issue of capital. The consideration for undertaking this issue would be the payment of a larger percentage for discount, brokerage, or commission, the rate of which would depend upon the price of the stock in the market at the time of issue. The Directors are advised by eminent Counsel that such a payment can only be made by a contribution from the shareholders' dividend fund, as the full par value must be obtained for the Company; and it is to provide for this that you will be asked to vote to-day in favour of a reduction of 1s. per cent. for the half year from the dividend upon the ordinary stock. Should the amount of such deduction be insufficient for the purpose, we should have to ask you to agree to another small deduction on the next half year. I need not say that the Court regret having to submit this proposal to the proprietors; but as it seems to be the only possible method of making a legal issue of the stock, the Directors rely upon your support in the matter, it being absolutely necessary in the interests of the Company and the shareholders that the Board should have in hand a cash balance sufficient to meet the weekly outgoings and the payment of dividends at the usual date. The fifth paragraph is of a very satisfactory character. We are able to announce that the gas-coal market, having passed through a period of most unnecessary and unnatural inflation, has relapsed to the condition it occupied during the spring of 1889; and we have succeeded in securing the whole of our supplies at a reduction of 8s. per ton. This fall in the price of coal has been accompanied by a proportionate reduction in the price of gas oil; but from the latter source we shall derive no benefit this year, as oil is a material which has to be purchased considerably in advance of coal requirements. The full benefit of both reductions will, however, be obtained at the opening of next year. Against these savings we have to set a reduction of our income from coke. As regards our residuals, we have had a very good year; but now we have to face a considerable drop in the price. When I tell you that a reduction of 1s. per ton on coke means for the Company a loss of £45,000 a year, and that we are offering Beckton coke, which represents about half of our total production to-day, at a price 8s. 6d. per ton below that of last year, you will realize, if the general public do not, that the gross saving in the cost of coal does not represent a sum of money to be forthwith devoted to a reduction in the charge for gas. This brings me to the question of the reduction of price announced in the report. The importance on every ground of selling gas at the cheapest possible price is realized by the Court of this Company as fully as by any other Board of Directors; and as evidence of this, we can point to the record of the Company in the past, for no company working under conditions similar to ours have, so far as I can ascertain, made greater sacrifices than we have to keep down the price of gas. Indeed, it was one of the charges our critics brought against us that we had dissipated our reserve. But the basis of the reserve fund was to meet revenue expenditure which otherwise could only have been met by an increase in the price of gas; and this sacrifice on the part of the shareholders then saved the pockets of the consumers of gas £437,500. Can any other gas company point to such a result as this? I am justified, therefore, in the claim I put forward on behalf of the Directors, that the interests of the shareholders of the Company are only considered in their due relation to the interests of the consumers. Those interests are, of course, under the sliding-scale identical. Well, when we had placed before us the accounts for the past half year, we saw that the reduction in price which we had fully hoped to make on Oct. 1 was absolutely out of the question. A reduction of 3d. per 1000 cubic feet would have cost, for the December quarter alone, £80,000; and towards this we could only have anticipated, under the most favourable conditions, a surplus amounting to £30,000. The effect of such a reduction would have been a further lessening of our undivided balance, bringing it down to some £50,000—an amount which is quite inadequate for a company of this magnitude, working under existing conditions. For the reasons I have given you, the position in the June half year of 1902 will be greatly improved; and we think we can see a sufficient margin of profit on that six months to warrant a reduction of 5d. per 1000 cubic feet from Jan. 1 next. I hope—I cannot put it more strongly, for I must not prophesy—that the profit on the trading for the whole year will, in addition, be sufficient to provide the increased statutory dividend of 10s. per cent. per annum. Thus the sliding-scale principle will again operate to the direct advantage of our consumers, who, by this reduction in price, will obtain an abatement of £420,000 a year; while the additional amount available for distribution among you as dividend will be £75,000 a year. Or, to put it in another way, the amount of additional profit we hope to earn next year—£500,000—will be divided between the consumers of gas and the shareholders in the proportion of 86 per cent. to the consumers and 14 per cent. to the shareholders. Now these few observations will be found introductory to what I have to say in reference to the matters that are dealt with in the sixth paragraph of the report. As we tell in this paragraph, we much regret that we have failed again to obtain further capital powers by our Bill of this session. When the Bill came up for second reading on March 14, the opposition in the House of Commons was so strong that it was considered better to withdraw the Bill than to challenge a division. This is all the more to be regretted as the Bill was framed with a view to meet, in the most liberal spirit, the recommendations of the Powers of Charge Committee. Its object was two-fold—the obtaining of the necessary capital, and the cheapening of the cost of gas. There seems, however, to have been some strange misunderstanding on these points; and I must deal with them fully, in order to justify the action of the Directors in framing the Bill. The allegation of the opponents to the second reading of the Bill was that we ignored the recommendations; and inasmuch as the President of the Board of Trade seemed to take this view of the case, it is all the more necessary that I should explain what was the intention of the Directors. Let us see what the facts of the case really were. Pausing for a moment only with reference to recommendation No. 1, I will deal with recommendation No. 2, which suggested that the area of the Company's district south of the Thames should be transferred to the South Metropolitan Company. There already exist powers under the Metropolis Gas Act, 1860, which would enable this Company to sell the district in question. There was, therefore, no need for further legislation, so far as we were concerned; and, more than this, we had already expressed our willingness to give effect to the recommendation. In fact, two years ago we agreed with the South Metropolitan Company the price to be paid on the basis of the then existing conditions as regards the outlay on the works and the sale of gas within the district. The House of Lords, however, refused the powers of purchase sought by the South Metropolitan Company, and so the agreement lapsed. The South Metropolitan Company this year have succeeded in obtaining powers from Parliament to buy the district; but these powers are hampered by conditions which will be found to effectually obstruct any proposal to carry out the recommendations we are now considering. The Directors of this Company, however, if approached by the South Metropolitan Gas Company, will be prepared again to discuss with them the question of price. But in such a discussion they will not lose sight of the fact that they are the trustees of the shareholders of this Company, and that they must be careful, in their negotiations, to safeguard the interests of their consumers on the north side of the Thames. Indeed, these points were evidently in the minds of the Rankin Committee when they attached to their recommendations the condition that a fair and reasonable price should be paid to this Company. There are several important elements which must enter into the price to be paid, and the conditions of the transfer. One is that Nine Elms is, next to Beckton, the largest and most economical of the Company's stations, and is, moreover, admirably situated for the supply of gas to the districts both north and south of the river. Again, it is in the district south of the Thames that the Company obtain their largest annual increase in business. Besides these, there are many other subsidiary points—in fact, I do not see any way, in default of agreement, of arriving at fair and reasonable terms except by arbitration. The Directors of the South Metropolitan Company have, however, definitely declined to entertain any suggestion of referring the matter to arbitration. Therefore the responsibility for any failure to carry out recommendation No. 2 cannot certainly be attributed to your Directors. Now we come to recommendation No. 3—namely, that the extra charge for gas supplied by means of automatic meters should be the same all over London. There was no need to introduce anything into our Bill as to this recommendation, seeing that it had already been dealt with in the last session of Parliament by an Act intituled the Metropolis Gas (Prepayment Meter) Act, which limited the extra charge for gas supplied under this system to 10d. per 1000 cubic feet. We pass now to recommendation No. 4, which was to the effect that no Company coming to Parliament for new capital powers should apply for more capital than would be required during a period of five years. The amount applied for by this Company was accordingly limited to £1,000,000, which would be just enough to meet the requirements of the Company during the next five years. It must be borne in mind that the capital expenditure of gas companies has been greatly increasing of late years by the adoption of the system of supplying gas by

means of the penny-in-the-slot meter, with stoves. This system is of the greatest advantage to the working classes; and it is certainly unlikely that Parliament would knowingly cripple this branch of a gas company's business. This, however, as I have said before, has been the effect of what Parliament has done in our case. The last recommendation, No. 5—namely, that an effort should be made by the Company to redeem obsolete capital by a sinking fund or otherwise, was directly and most liberally complied with by the Directors in their Bill, because, for the first time, it is believed, in the history of gas companies in England, the Directors proposed to write down capital expenditure by means of a sinking or reduction fund, and the money necessary for this object was, under the Bill, to be provided, not by the consumers, but wholly by the shareholders, by a direct reduction of 5 per cent. from the dividend on the ordinary stock. The effect of the operation of the scheme would have been that the ordinary stock of the Company to the extent of a million, carrying 4½ per cent. dividend, would have been bought up and cancelled within about 25 years, and five-sixths of the saving in dividends thus effected would have gone into the pockets of the consumers, while the shareholders would have had to find the whole of the redemption-money. Now, then, could it be fairly contended, as regards these four recommendations out of the five, that the Directors, in the preparation of their Bill, had treated the House of Commons disrespectfully, by wilfully—or impudently, as one honourable member (Mr. Sydney Buxton) had said—ignoring the recommendations of the Committee? We come now to the remaining recommendation—No. 1. Because of its importance, I will read it to you—

That whenever any of the Metropolitan Gas Companies again come to Parliament for an extension or alteration of their capital powers, a revision of the sliding-scale should take place, and that the standard price should be reduced to 3s. 3d. to carry the standard dividend of 10 per cent., and that the existing scale of increase and decrease of dividend of ¼ per cent. for every 1d. of decrease or increase of price below or above 3s. 3d. be maintained, and that a secondary or additional scale be imposed which should permit of an increase or decrease of dividend over and above that regulated by the present scale of ¼ per cent. for every complete 3d. of decrease or increase below or above the standard price of 3s. 3d.

This recommendation was evidently framed with a single purpose—namely, that gas should be supplied to the consumers as cheaply as possible. The Committee, indeed, describe these suggestions in their report as suggestions for reducing the price of gas. This being so, the Directors considered how they could best bring the result about; and they came to the conclusion that the best method would be to raise the required capital by means of 3 per cent. debenture stock instead of by ordinary stock, which could not, under the terms of the Rankin scheme, or by any other method, be issued at a lower interest than from 4½ to 5 per cent. The Directors could, no doubt, have proposed to raise the additional capital by new ordinary stock, with the usual proportion of borrowing powers attaching thereto with the proposed new scale of price and dividend; and this could have been done, as regards new ordinary stock, without any interference or injustice. But the effect of such a mode of raising money would be that the whole capital—viz., £1,000,000—would have to bear an average rate of interest of 4 per cent., whereas by the Company's proposal the capital would have been obtained on the basis of 3 per cent., and the saving effected by this means would have gone towards the reduction in the price of gas. No company could have more strenuously endeavoured to meet the spirit of this recommendation than by asking to be allowed to raise their capital at the cheapest possible rate. It must also be borne in mind that the proportion of ordinary stock in this Company is very large; and every opportunity should be taken to reduce it. By their proposals the Directors sought to effect this, and to bring the Company more into line with other companies in this respect—to increase the proportion of their loan capital by concurrently raising new capital by debenture stock and cancelling ordinary stock. This was the policy which was advocated by Sir Thomas Farrer, in his Memorandum of 1876, which was issued at the time when the sliding-scale and the present system were inaugurated. In dealing with the charge brought against this Company that they have ignored recommendation No. 1, you will remember that by our proposal in the redemption fund clause of the Bill the Company were, in effect, agreeing to forego for a time what was equivalent to 2½d. per 1000 cubic feet of the standard price of 3s. 9d.; but some of the Company's more extreme opponents assert that recommendation No. 1 is meant to apply not only to new ordinary stock, but also to the whole of the Company's existing stock. Certainly, this view finds no expression whatever in the report or in the recommendation; and most certainly this is a theory which the Directors, bearing in mind the transaction of 1876, and generally the conditions on which the stock of the Company has been raised, absolutely decline to accept, especially with reference to the capital which has been raised under the Company's Act of 1876. Under that Act, about £950,000 of ordinary capital has been sold by auction or tender on the faith of the maintenance of the 3s. 9d. standard price and of the corresponding standard dividend, and of the sliding-scale clauses of that Act. And the premiums (I beg your attention to this) which have been paid the Company—shared by the consumers as regards six-sevenths of the premiums which have been obtained by such sales—have amounted to £1,079,000, or at the rate of 100 per cent. premium. I will not take up time by recapitulating the history of the past legislation, which culminated in the Act of 1876, under which we are now carrying on our undertaking. It will be sufficient to remind you that that Act was a solemn compact entered into and sealed by the Company and the Municipal Authorities with the sanction of the Board of Trade, and confirmed by Parliament; and that under its provisions the Company gave up several valuable statutory rights, such as an assured 10 per cent. I will not stop to explain the revision clauses, and all the means by which these were secured. But you may take it as absolutely true that up to 1876 the Company's ordinary capital carried a dividend of 10 per cent., which was practically secured, and, secondly, the allotment of new stock among the shareholders at par. This, of course, when you remember what I said about the premium a minute or two ago, was a very great concession on the part of the shareholders. Thirdly, there was the power to pay back-dividends (up to 10 per cent.) for a retrospective period of six years, which was another very valuable concession. I have explained to former meetings what would be the outcome of the application of this policy, which I have called "the policy of confiscation," which is the essence of the suggestions made; and I must again repeat (as it cannot be too widely known) that the proposal, if carried out, would involve the abrogation of a parliamentary bargain, and the confiscation of the statutory scale of dividend to the extent of 6d. per 1000 cubic feet—that is, of 12s. per cent., or £90,000 a year, from your dividend, which, if capitalized at 4 per cent. (which is our standard rate of dividend), amounts to two-and-a-quarter millions of money. And all this dishonest repudiation of parliamentary obligation is to secure what? Just one penny reduction in the price of gas. It is for this paltry reduction that the policy of glaring dishonesty is advocated. The question for us is: Is Parliament likely to incur such a breach of public faith? I repeat what I said last year—that your Directors, having invited the public to invest money in our stock at auction, and to pay a high premium price on the faith of, and in the terms of, an Act of Parliament, could never introduce a measure having for its object a revision of the terms in favour of simply one party to the bargain without considering the other party at all. To do so would be a base betrayal of the trust which has been reposed in us; and I do not believe that Parliament desires to impose upon us, without any sort of obligation, the confiscation of our statutory rights. Such a policy would not end with this Company. It would have far-reaching effects; and the faith of the public in parliamentary bargains would sustain a blow which would render the raising of capital a matter of the greatest difficulty. The action of Parliament in rejecting the Company's Bill has placed us admittedly in a somewhat awkward position; and the Directors are giving their fullest consideration to the question as to the course to be adopted under the circumstances. At present, it would not be expedient, even if it were possible, to say more than that they hope to be able to prepare such a scheme as will satisfy the reasonable requirements of Parliament, and at the same time protect the interests of the shareholders. I have already dealt with the subject of the seventh paragraph of the report; and, as I have detained you so long, I will now conclude by formally moving the resolution that this meeting do agree with, and confirm, the Auditors' report and the statement of the accounts of the Directors, as submitted.

The Deputy-Governor (Mr. H. C. Ward) seconded the motion.

Mr. C. E. Jones said the shareholders were indebted to the Chairman for his lengthy address, and for the lucidity with which he had explained the Company's position. They were very proud that the Board had put their backs up against confiscating the property of the Company at the dictation of a few Members of Parliament who wanted to gain a little transient popularity in order that they might do an injustice. He looked upon the report as quite as favourable as they could possibly expect. It was true there was a shrinkage of trade; but this was due to circumstances over which the Board had no control. First there was the abnormal rise in the price of coal; then they had the Royal mourning; and afterwards the extremely fine weather. But they had endured shrinkage of trade on several occasions, and they would have to do so again. Fluctuation in gas trade was inseparable from the nature of the business. The climatic changes in this country would always affect the sale of gas. He hoped the next report would be quite as favourable as the present one. If it was, he was sure he would be satisfied. Dealing with the sixth paragraph of the report, he said it was not pleasant reading by any means; for the Company, after an existence of ninety years, seemed to have lost the favour and confidence of Parliament. This was a very awkward position—indeed, it was a deadlock; and, as a *modus vivendi*, he would suggest, for the consideration of the Directors, whether they could not give the consumers some representation on the Board. In this way they might have nominee representatives who would sit on the Board and discuss in a friendly way with the Directors any parliamentary proposals. The opponents of the Company said they wished to avoid the recommendations of the Powers of Charge Committee; but really the Board did not wish to do anything of the kind. These rough places could be made smooth if the parties were brought together; and he would suggest that some such provision as he had mentioned should be inserted in the next Bill. The plan had been found to work very well at Sheffield, where it had been in operation for a number of years; and gas there was cheap, and maximum dividends were paid. The policy he had advocated would result in abolishing misconception and in removing popular prejudice; it would give the local councils an interest in gas affairs; it would disarm opposition, and save some trouble and legal cost; and it would, no doubt, in the end promote the best interests of the Company.

A Shareholder asked what was the charge for gas supplied through automatic meters.

The Governor replied that it was 10d. beyond the usual price on both sides of the Thames. The charge for gas was regulated by Act of Parliament, and the charge of the Company south of the Thames was regulated by the price which was charged by the South Metropolitan Company. On the top of that, for gas supplied through automatic meters a further 10d. was charged for the meter and the stove.

Mr. George Livesey, referring to the suggestion made by Mr. Jones, said he thought there was only one Company in the kingdom who had nominee Directors, and that was at Sheffield, where they had eight ordinary Directors and three nominees. If the suggestion were adopted in this case, the London County Council would want a nominee, the City Corporation one or two, and every Borough Council would want a Director—with the result that there would be twenty nominee against seven ordinary Directors. He thought this fact was a sufficient answer to the suggestion; and, moreover, it would not solve the difficulty at all.

Mr. Jones observed that nominee Directors would not have a vote.

Mr. Livesey said Mr. Jones had expressed a hope that the half-yearly report next year would be as satisfactory as the present one; but he (Mr. Livesey) could not but feel that the condition of the Company was very serious—in fact, it was disastrous—and the present was no time for trifling or for fault-finding. He had not risen for the purpose of criticizing or fault-finding in any way whatever, but to put before the shareholders the position in which they stood. Dealing with the question of coke, he agreed with all that had been said. Something had been saved in the price of coal, but this something was lost

in the price of coke. Last year coke was sold at 22s. a ton. This year an attempt had been made to get 14s. But it had not succeeded; and the South Metropolitan Company had entered into contracts at 12s. 6d. a ton. With regard to the proposal for the issue of stock, and the recommendation that shareholders should give up 1s., it was a trifling matter, no doubt, and he should not object to it. But there was a question whether the meeting had the power to vote it, as no notice had been given of it. He very much doubted whether £7500 would be enough to float £160,000 of ordinary stock. His objection to the proposal was that it would not get the Company out of the difficulty—in fact, none of these things would do so until they had submitted themselves to Parliament. It was of no use for the Company to set their back against Parliament. Parliament had made up its mind that the price of gas must be reduced, and there were no men experienced in gas matters who were not fully convinced of this fact, except the Directors of this Company. The first thing for the Gaslight and Coke Company to do was to accept the conditions laid down by Sir James Rankin's Committee, the chief of which was the reduction in price. If they stood out, as was suggested, their hands would be forced; and therefore he did urge upon the shareholders the importance of making up their minds upon the subject. He quite appreciated the position which the Governor took up—that what was proposed was confiscation. But if Parliament chose to impose it, the Company would have to accept it. Suppose the shareholders were to say: "We are quite willing to allow the Directors to accept the proposal, if they think well," this would free the hands of the Board, and a clause could be introduced in the next Bill accepting the proposal. There would be a great deal of fairness in such a proposal. He quite believed that Sir James Rankin's Committee went too far, and that in proposing the reduction of 6d. per 1000 cubic feet they were doing an injustice to this Company. He did not believe that Parliament would insist upon so large a reduction. The present standard price was 3s. 9d. per 1000 cubic feet. For every 1d. at which gas was sold below this sum, the shareholders were entitled to an additional 2s. per cent. dividend; so that if gas were sold at 3s., they would be entitled to £4 18s. Taking the initial price at 3s. 9d., suppose they reduced it 1s., which was not an impossible figure, this would entitle them to twelve times 2s. additional dividend—making a total of £5 4s. per cent. Parliament proposed that the initial price should be lowered to 3s. 3d. per 1000 cubic feet, or a reduction of 6d., the effect of which would be that the shareholders would be mulcted in dividend—that was to say, they would get a lower dividend under the new initial price than they were entitled to under the old, until the price was reduced to 1s. 9d. per 1000 cubic feet. This was an unfair thing; it would penalize the Company after they had reduced the price to what he should consider a fair figure. Sir James Rankin's Committee, while proposing a reduction of the initial price, proposed also an increase in the increment of dividend—instead of 2s. for every 1d. reduction, we were to get 2s. 8d. When we were selling gas at 2s. 9d., the dividend to which the shareholders were entitled would be £5 4s., just as it was with a 3s. 9d. initial; and what Sir James Rankin's Committee took off one end they put on the other. He strongly suggested that it would be a good thing for the Company to put themselves right with Parliament; for when this had been done the first and the best step would have been taken to restore the Company to the position which they ought to occupy.

The Governor said Mr. Livesey had practically dealt with the suggestion raised by Mr. Jones; but, in addition, he might say that the state of things which Mr. Jones desired could only be attained by going to Parliament, and Parliament, having refused many things, might refuse that. Even if they did not refuse it, the Company would think many times before they presented such a scheme to Parliament, as it would give representation without any power of giving effect to the views and ideas of those who sat with the Board to assist. The only other point on which discussion had taken place was with regard to recommendation No. 1. Mr. Livesey and he (the Governor) took different views of this matter. Mr. Livesey had always held the view that the intention of Sir James Rankin's Committee was to make the recommendation retrospective; but having spoken to many Members of Parliament upon the subject, he understood from them that the matter was never discussed, and did not form part of the decision. He quite agreed that, if Parliament had made up its mind to what he called confiscation, their opposition must give way; but until Parliament had done so, they were bound to maintain the legal position which he had that day laid before the shareholders. This point could only be settled by Parliament when the Company brought in a Bill to attach the 3s. 3d. scale to new capital which they proposed to raise.

Mr. Livesey: Do not go for 3s. 3d. initial price.

The Governor said it did not matter whether it was 3s. or 3s. 3d., as regarded the new stock, because the public in subscribing for it would only give the amount of money which the 3s. or 2s. 9d. might represent. No one would be a penny the better or worse off if they made it 3s. 3d. or 3s. 6d.; but it would give an opportunity of dealing with the question. When the Bill came on for second reading, no doubt some member would move as an amendment that the new initial price should refer to the whole of the capital; and if Parliament so voted, that would be an instruction to the Committee, and the responsibility of the Company would be at an end. The Directors would not have given the shareholders away, but would simply have to obey the instructions of Parliament. He thought when Parliament came to learn the whole of the facts, and were told that a reduction of 3d. would only lower the price of gas 1d. per 1000 cubic feet, they would pause before inflicting such a penalty upon innocent shareholders for so paltry a reduction. As to doing this voluntarily, it might be said: "Why should you not do it in the same way as the South Metropolitan Company have done?" But that Company were in a different position. They had a far greater increase of business than the Gaslight and Coke Company; and their immediate future would soon recoup them for what they gave up. As a matter of fect, they gave up nothing; but it would affect the Gaslight and Coke Company most seriously. Mr. Livesey spoke of cheapening the price; but this was impossible, until the heavy capital had been reduced by some means or other. He hoped 2s. 9d. was within the bounds of possibility. The Directors had no intention of setting up their backs improperly against the views of Parliament; but what they wanted was to have the question raised and fairly debated on the floor of the House. The recommendation of a Committee, however exalted, was not legislation; and recommendation could not make it incumbent upon the Board to bring in a Bill for the repeal of the rights and privileges of the shareholders. The proper way to raise the point was on an application for new capital. He hoped the strong adjectives used by Mr. Livesey about disasters, and so on, were due to the heat of the weather. He could assure them the Company were not in a bad way at all. The business was a sound and good one; and when it was remembered that 1d. per 1000 cubic feet meant £90,000 a year, they need not be afraid of going into the Bankruptcy Court just at present, especially with the reduction in the price of gas from January next.

The resolution for the adoption of the report was then put, and carried unanimously.

The Governor: Gentlemen, before I submit the resolution authorizing us to deduct 1s. from the dividend, I should like to say a few words by way of explanation, so that there may be no misunderstanding as to the nature of the proposal submitted. The Directors have taken Counsel's opinion as to whether they could pay out of the funds of the Company the commission necessary to get the ordinary stock taken up at par; and Counsel have advised that the money required for this purpose must not come out of the general funds of the Company, but must be in the nature of a direct deduction from the dividend payable on the ordinary stock. By this measure, the provisions of the Company's Act will be complied with, and the sale of the stock at par will be achieved. The Directors therefore propose, in order to raise sufficient money to pay a commission to the parties taking the stock at par, that a deduction of 1s. should be made from the dividend payable on the ordinary stock, so that the dividend will be £2 3s. instead of £2 4s. If you take the stock at 95, it would not involve a second deduction; but if we have to issue it at a lower price than 95, we should have to come next year for another 1s., or for 6d., to make up the difference. It is really a voluntary act on your part; it is a sacrifice which we ask you to make in order to improve the position of your own property, and, in fact, to relieve it from financial pressure. This financial pressure is no fault of ours whatever. The Act of Parliament under which we are precluded from issuing stock below par was passed when our stock carried a large premium. At the time of the consolidation, in 1898, our stock stood at 300 in the market. The par price of 100 is only 40 or 50 now. Therefore, equitably and fairly, we should be allowed to issue the stock at a discount; but Counsel tell us we cannot do it. We must have the unissued capital; and therefore we ask you to give us your support in an action which has for its object the benefit of the Company by giving us this small sum. If any shareholder stands on his legal right, he can object; and the effect would be to throw a little more burden on those who do not object. With that explanation, I move the ordinary dividend resolution.

A Shareholder asked whether the stock was not now above par.

The Governor replied that it was not.

A Shareholder pointed out that, as notice of the deduction had not been given, he questioned very much whether there was power to do what was proposed.

The Governor said no doubt they had not the power; it was a perfectly voluntary action. It really was a recommendation to all the proprietors.

Mr. Livesey remarked that if any shareholder requested to be paid his dividend in full, the Company would have to pay it.

The Governor said this was so. He then moved the payment of the usual statutory dividend, with an addition that there be deducted therefrom an amount equal to 2s. per cent., this amount to be expended in defraying the expenses of the commission in raising at par the existing balance of unissued stock.

The Deputy-Governor seconded the motion.

A Shareholder protested that notice of the proposed deduction ought to have been given to every shareholder.

The Governor observed that notice had been given. In the report it was stated: "The Directors have now under consideration a proposal for placing the ordinary stock at par, in accordance with the provisions of the Company's Acts, and, should they be able to agree to terms, they will ask the shareholders to provide for the expenses of the issue by means of a deduction from the dividends payable in September and March next."

The Shareholder said this was perfectly true, but the amount proposed to be deducted was not stated. There was no doubt at all that a great number of shareholders would object to the proposed deduction.

A Shareholder asked whether the Directors were going to contribute, by a reduction of their fees.

The Governor replied that the Directors were very considerable shareholders, and they would thus contribute a large proportion of the amount. His own family held more than £100,000 of the Company's ordinary stock.

A Shareholder asked whether, if the resolution was carried, the Board would consider themselves entitled to make the deduction.

The Governor said that a copy of the resolution would be sent to every shareholder, and if anyone did not agree to the proposed deduction, and asked to be paid in full, he would be paid.

The motion, on being put, was carried with six dissentients.

A vote of thanks was then accorded to the Governor for presiding; and the proceedings closed.

Sale of Shares and Stock.—At the Mart, Tokenhouse Yard, E.C., last Tuesday, Mr. Alfred Richards sold, by order of the Directors, some new ordinary 5 per cent. stock of the Southend Gas Company (last dividend 5½ per cent. per annum) at prices ranging from £109 10s. to £110 10s. per cent., and some 4 per cent. debenture stock at £100, £100 2s. 6d., and £100 10s. (one lot) per £100 of stock. On the same occasion, some fully-paid £10 ordinary shares in the South-West Suburban Water Company (last dividend 5 per cent.) fetched £14 7s. 6d. and £14 10s. each; some ordinary stock of the Crays Gas Company, £103 per cent.; and some fully-paid ordinary £10 shares in the Bromley Gas Consumers' Company (last dividend 9 per cent. per annum), £20 each.

SOUTH METROPOLITAN GAS COMPANY.

Half-Yearly Report.

The following is the report of the Directors of the above-named Company for the six months ending June 30 last, which, with the accounts for this period, will be presented to the proprietors at the meeting on the 14th inst. :—

The price of gas coal, which advanced from 6s. 6d. per ton, free on board in the Tyne, in 1898, to 8s. in 1899 and to 16s. in 1900, came down to 9s. in the spring of the present year, when the Company made their annual contracts. Concurrently, however, with falling prices for coal, the value of coke has fallen at least in equal proportion. Consequently, the apparent saving of 7s. per ton on this year's contracts is reduced to less than half that amount.

The Directors have reduced the price of gas from 2s. 8d. to 2s. 3d. per 1000 cubic feet from midsummer. This reduction gave them unqualified satisfaction, as the raising of the price last year was a source of great regret. Prior to that advance, the Company's business was increasing at an almost unprecedented rate; but with the rise in the price of gas a year ago, the increase of consumption all but ceased, and continued at a very low figure until the reduction to 2s. 3d. was announced. The rates of increase during the last four half years have been: December, 1899, 8¾ per cent.; June, 1900, 12¼ per cent.; December, 1900, 1¾ per cent.; June, 1901, 1¾ per cent. But since the announcement of the reduction of price, the increase for the month of July has been 9 per cent.; the weather and the temperature being about the same in 1901 as in 1900.

The extraordinary development in the use of gas by means of slot meters shows no signs of flagging—6413 new consumers by this system having been added in the half year; the total now being over 116,000 of this class of consumers gained in the short period of nine years. There is in this business a double satisfaction; it is an advantage to the Company, and evidently supplies a want by adding to the comfort and safety of the wage-earning class.

The Directors have the pleasure to report that the Bill sanctioned by the proprietors at the meeting in February last has passed both Houses, and only awaits the Royal Assent. It authorizes the transfer to the Company of the southern district and works of the Gaslight Company, subject to their obtaining an Act next session. It gives power to raise a million of share and loan capital in addition to another million if the above-named transfer takes place; and the Company is authorized to offer new issues of stock directly to the consumers of gas at a price fixed as near as may be to the current market quotation.

The Company have so far been unsuccessful in obtaining from Parliament protection against the serious damage which they believe will result to their mains and pipes by electrolytic action—that is, the eating away of iron pipes by the return currents of electricity from electric railways and tramways. These undertakings must be compelled to prevent damage to gas and water pipes; and your Directors will not rest until full protection is secured.

In 1900 the Company obtained an Act authorizing the reduction of the illuminating power of their gas from 16 to 14 candles, with a concurrent reduction of the initial price of 1d. per candle. The Act required the Company to reduce to 15 candles from July 1 last, and to 14 candles at any time prior to 1905. The Directors, however, thought it better to bring down the standard at once to 14 candles. So far the official daily tests show an average reduction of about 1 candle only. It will take time to work down to the new standard; but the consumers may be informed that it will make no appreciable difference to them in the matter of light.

In reference to the officers and workmen, the usual statement may be repeated. They are animated generally by such a spirit of goodwill to the Company, that there is never a difficulty, never a care or a moment of anxiety, so far as labour is concerned, to interfere with the working of the undertaking.

In 1898 the proprietors approved a scheme for the election of workmen Directors by their fellow shareholding workmen. To provide for possible failure, the scheme was to be "in force for three years and no longer." The system has worked, so far, most satisfactorily, without any difficulty or disadvantage whatever. The Directors will, therefore, submit a new scheme for the consideration of, and, if approved, adoption by, the shareholders at the special general meeting to be held after the ordinary meeting. The new scheme is practically identical with the original, except that a term of nine years is proposed, but subject to reconsideration by the shareholders every third year.

The profit for the half year, after paying all fixed charges, enables the Directors to recommend the payment of the full dividend at the rate of 5 per cent. per annum, to increase the insurance fund by £14,671, and to carry forward £21,568 14s. 3d.

BRENTFORD GAS COMPANY.

Half-Yearly Report and Accounts.

In the report which the Directors of this Company will present to the proprietors at the half-yearly meeting next Friday, they announce a satisfactory increase of 4·48 per cent. in the quantity of gas sold in the six months ending June 30, as well as a considerable addition to the number of consumers, both ordinary and automatic. These now amount to 23,237 and 20,971 respectively. The accounts accompanying the report show that a sum of £14,743 was expended for capital purposes in the six months; £8060 being for new buildings and machinery, £6225 for mains and services, and £458 for meters and stoves. The total expenditure on capital account at the close of the half year was £1,038,141; leaving a balance of £22,969 unexpended out of the total of £1,061,110 called up. The revenue from the sale of gas amounted to £132,630; rental of meters and stoves, to £11,510; and residual products, to £36,551—the total being £180,735, compared with £169,578 for the corresponding period of 1900. The expenditure on the manufacture of gas was £104,859, against £87,941 (coals costing £82,608, compared with £65,915); on distribution, £20,354; and on management, £4975—the total being £145,034, against £123,618. The balance carried to the profit and loss account is £35,701; whereas this time last year it was £45,960. The balance applicable for distribution is £72,011, against £78,703; and the Directors recommend dividends at the rates of 5, 12, and 9 per cent. per annum on the three classes of stock. The statements relating to the manufacturing operations show that, under the supervision of Mr. J. Husband, 69,899 tons of coal, and "Solar" oil equal to 22,297 tons, were employed in the production of 985,219,000 cubic feet of gas, of which 898,251,000 cubic feet were sold and 912,251,000 cubic feet accounted for. The estimated quantities of residuals produced were: Coke, 43,637 tons; breeze, 5843 tons; tar, 841,785 gallons; ammoniacal liquor, 18,678 butts of 108 gallons.

ASCOT DISTRICT GAS COMPANY.

The Half-Yearly Ordinary General Meeting of this Company was held last Thursday, at the London Offices, No. 46, Cannon Street—Mr. ROBERT BERRIDGE, Assoc.M.Inst.C.E., in the chair.

The SECRETARY (Mr. W. A. Schultz, F.C.A.) having read the notice convening the meeting, the Directors' report and the statement of accounts for the half year were taken as read.

The CHAIRMAN, in moving the adoption of the report and accounts, said a profit of £1071 was shown for the half year; and, after providing for every charge against the working, there remained a balance of £1850 at the credit of profit and loss account, out of which the Directors recommended that a dividend at the rate of 5 per cent. per annum be paid, and the balance, amounting to £585, be carried forward. The revenue (including that derived from the Bagshot works, which were taken over at Midsummer, 1900) showed an increase of 29 per cent. on the corresponding period of last year. The Directors considered the result of the half-year's working exceedingly satisfactory, seeing that they had had to pay an additional £700 and more for coal. Since the previous report was issued, the Directors had caused the whole of the mains in Bagshot to be relaid. Most of them were found to be in a very leaky condition; and it was hoped a large saving had been effected by the carrying out of the work. Of course, it had cost a certain amount of money; but they would recoup that in time. The Board had also placed an order for the erection of a new double-lift holder, of a storage capacity of 200,000 cubic feet. Regarding the recent issue of 819 shares, he said the shareholders had applied for 346; still leaving unissued 473. Proceeding to comment generally on the affairs of the Company, he observed that, according to their Act, they were compelled to hold the meeting in August. That day being the 1st of the month, he thought they had made a record for the promptness with which the balance-sheet had been got out. For this, he expressed their acknowledgment to Mr. Schultz and the Engineer (Mr. A. E. Brooks). Reverting to the revenue, he said it had still gone on increasing; and although the increase included that derived from the works at Bagshot, there was still a substantial advance on the general working of the Company. The profits, however, compared with last year, were slightly smaller. In the first instance, an amount of £50 had been set aside for doubtful debts at the request of the Auditors. The Directors were not prepared for this; but they were compelled to do it. Although the debts for which the sum had been reserved were not likely to become bad, many of the consumers in the district being people in high positions, it was difficult to obtain prompt payment of their accounts in some cases. Then the half year had borne the full brunt of the dear coal; the previous half year having received the benefit of the stock of the cheaper coal, and the coming half year would only have to bear the high price in respect of the stock of dear coal on hand at June 30. The statement of gas made and sold showed a considerable increase in the total quantity unaccounted for. This was partly due to the fact that the meters were taken four or five days earlier than at the corresponding period of last year, but, in a great measure, to the fact that the whole of the mains in the Bagshot district (as previously stated) were relaid during the half year, and this had necessarily involved the loss of a fair amount of gas. The percentage of unaccounted-for gas was shown as 14·2; but this was reduced to 12¼ per cent. by the meters being taken a few days earlier. The excavation for the new gasholder had been commenced; and the Directors hoped that, before the next meeting, this would be completed. When the holder was finished, the Company would be in possession of a storage capacity equal to their needs for some years. Then they did not anticipate the expenditure of further capital for a long time to come, except, of course, for such things as new meters, which they could not avoid. Comparing the figures with those for the corresponding half of last year, he said the profit made was £1071, as against £1161. This was a decrease; and the amount carried forward was also less. It was £585, as compared with £893. The quantity of gas made during the half year was 15,080,000 cubic feet, compared with 11,763,000 feet. The amount of gas made per ton of coal carbonized was 10,695 cubic feet, against 10,355 feet. He believed this was exceedingly satisfactory. The quantity of gas sold during the half year was 12,726,000 cubic feet, as compared with 10,454,000 cubic feet. The amount received for coke per ton of coal carbonized was 9s. 7d., as against 8s. 2d.; while the amount received per ton of coke sold was 27s. 4d., as against 18s. 8d. The number of ordinary consumers at the close of the half year was 434, as compared with 400; and of prepayment consumers 190, as against 137. [It was explained by the Secretary that the figures included the increases at Bagshot, but not the consumers taken over.] The stoves on hire, the Chairman further stated, including prepayment ones, numbered 276, as compared with 151; and they had now 127 public lamps, as against 98. He thought this record showed the Directors were doing the best they could for the Company. They were prospering; and he trusted they would go on doing so.

Mr. SAMUEL SPENCER, in seconding the motion, congratulated the Directors and the shareholders on the result of the working, which he regarded as good considering all the circumstances.

Mr. SAMUEL WHILE, remarking that there was still 12½ per cent. of unaccounted-for gas, asked whether that would be reduced.

Mr. HENRY WOODALL explained that the accounts showed a leakage

of about 14¼ per cent.; but this was reduced to 12¾ per cent. by taking into account the fact that the meters were read about five days earlier than ordinarily. It did not, however, take into account the leakage that was due to the alteration of the mains at Bagshot. In a concern as small as theirs, in re-laying a main, to say nothing of the general system of mains, there must be a considerable amount of loss in relation to the output. In laying a mile of main in connection with a large concern, there was a certain amount of loss, which was the same —no greater nor less—than there would be in the case of a small undertaking; but the leakage in the one case might only represent ·001 per cent. on the output, whereas in the other it might represent 10 per cent. of the output for the time being. Therefore, as the main laying had been going on for a considerable time in Bagshot, there must have been a large amount of waste, and to that extent the accounts would be better next half year.

It was pointed out by Mr. CHARLES GANDON that the Auditors' certificate was not printed in the accounts as prescribed by the new Act; but, according to explanations by the CHAIRMAN and the SECRETARY, it is considered that the new Act only applies to Companies working without a Special Act.

The motion was unanimously carried.

On the proposition of the CHAIRMAN, seconded by Mr. ALFRED KITT, a dividend was declared at the rate of 5 per cent. per annum, less income-tax. It was remarked by Mr. Kitt that on the new coal contract a considerable reduction in price had been obtained; so that although the profit and loss account on this occasion showed that they had not quite earned the amount required to pay the dividend, the reduction in the price of coal would compensate for this in the current half year.

The usual complimentary votes concluded the proceedings.

LONG EATON GAS-WORKS PURCHASE.

Negotiations to Proceed.

The proceedings at a recent meeting of the Long Eaton District Council led one to suppose that that body had completely made up their minds to discontinue their efforts to obtain possession of the gas-works; but evidently something has transpired to cause the Chairman (Mr. George Smith) and other members to change their views. For at the meeting of the Council last week, the Chairman moved that negotiations be opened with the Company with a view to the purchase of the gas-works by private treaty. He said he had two or three reasons for moving the resolution; the chief being that public bodies ought to manage the gas and water supply for the benefit of the public. The second reason was that the purchase would not cost the ratepayers one penny. The third reason was that the purchase would give a great impetus to the consumption of gas. Twice during the last twenty years had the town offered to purchase the works; and twice the Gas Company had refused to sell. For the third time the opportunity had come; and he thought the Company would not refuse on this occasion. The trend of municipal and local bodies was to purchase gas and water works. The returns proved that municipal bodies had purchased 253 gas-works; and of this number only 7 showed a deficiency, and then only so slight as to be of little consequence. Of 53 towns only 5 showed a deficiency, while some of them had a very good balance, which in the great bulk of cases had been applied in aid of the district rate. Of 17 towns which had acquired gas-works, 14 had purchased by arbitration and 3 by agreement. He thought the purchase would be good for the Company and good for the ratepayers. By arbitration he believed the Gas Company would have little to gain. He wanted to give a sum for the works that was right and just; and he considered the Council should offer £99,000, to include costs of transfer and the costs of the Bill promoted in Parliament. His impression was there would not be another opportunity of purchasing the works; and their acquisition would be a real town improvement. The output of gas was 59 millions; and the profit amounted to £4566. Mr. Maskell said it might be taken that the output reached 74 millions. In fifteen years the quantity had been trebled. Mr. Wallis asked if anything had transpired since the last meeting to justify the Chairman's change of attitude on this question. The Chairman replied that he then stated it was no use going for the purchase of the works without naming a definite sum. Mr. Wallis: But one of the Directors assured us it was useless to approach the Company by private treaty.

The motion was seconded by Mr. Houghton, who remarked that the Council ought to acquire the gas-works; but he would prefer to proceed by arbitration, believing the price would be less than that named by the Chairman. Mr. Crowe was against the motion, on the ground that gas would not be the light of the future. Mr. Winfield could not understand the position taken up by the Chairman, who had opposed the approach of the Company to sell. If they would sell at a reasonable price, he was in favour of purchase. Mr. Chester said the sum named by the Chairman was higher than had been given in some places where the gas-works had been purchased. He would not hold up his hand for a Committee to meet the Gas Company again after the disgraceful way they were treated on the last occasion. Mr. Butler was not in favour of compulsory purchase. On the principle that all public works ought to belong to the ratepayers, he supported the motion. Mr. Wallace did not think the gas-works were worth the price named. Not one ratepayer in a hundred would vote for paying £100,000 for the works; and he objected to officials of the gas-works making speeches to influence the members.

The Chairman assured the members that he had brought up the subject as a matter of public policy. If the shareholders of the Company were sensible men, they would sell at the price named. Mr. Sheffield believed there was an under-current at work; and the Company would sell. Mr. Winfield asked what ground of hope the Chairman had that the Company would sell. The Chairman answered that more was now known than when the subject was last discussed.

The motion was then altered as follows: "That a Committee be appointed to meet the Directors of the Gas Company, with a view to purchase the gas-works by agreement." This was carried by six votes to four; and a Committee of three was appointed.

SUGGESTED INTRODUCTION OF PROFIT-SHARING BY THE COMMERCIAL GAS COMPANY.

We learn that the Directors of the Commercial Gas Company have decided to extend to their workmen the benefits of profit-sharing, which has proved so advantageous to the employees of several other companies; and the scheme drawn up to carry out their intention is now under consideration by the men. It is proposed to give each man an annual bonus upon his wages on the following scale: When the price of gas is 3s. 3d. per 1000 cubic feet, ¼ per cent.; when it is 3s. 2d., 1 per cent.; when it is 3s. 1d., 1¼ per cent.; when it is 3s., 2 per cent., and so on—¼ per cent. bonus being added for every penny reduction in the price of gas. The charge being at present 2s. 8d., the rate of bonus would be 4 per cent.; and any reduction would, of course, be followed by a proportionate rise in the bonus. The granting of the bonus is conditional upon the men signing an agreement for a year's service with the Company. The privilege of signing the agreement and participating in the bonus will be given to winter men upon certain special conditions which have been framed to meet the case. A Committee of Management, consisting of the Chairman of the Company, eleven nominee Directors, and twelve workmen elected by their fellows, will be formed to settle all details. In making their proposal, the Directors desire it to be clearly understood that every man is free to accept or decline the offer, and that the bonus has nothing to do with the rate of wages paid. They therefore reserve the right to withdraw the scheme if, after a fair trial, it fails, in their opinion, to fulfil its objects. They further point out that the men will be perfectly free to belong to their Trade Union or not, as they think fit. The Directors invite careful consideration of the offer, and inquiry of the workmen of other companies as to their experience of profit-sharing.

THE RECENT STRIKES AT THE CORK GAS-WORKS.

In view of the many inaccuracies which have been circulated respecting the labour troubles at the Cork Gas-Works in February and May this year, the Directors have issued a statement of the actual facts. It bears the signatures of the Chairman (Mr. George Lynch) and his five colleagues on the Board, and is as follows.

The first strike took place in February last, and was quite as unjustifiable as the present one. Three men of a particular shift having requested leave of absence, without giving any reason whatever, the Manager informed them he could not possibly spare so many, but he would try if he could arrange to give leave to one, or perhaps two. The men were not satisfied, and all three left their work without permission; causing considerable inconvenience, as the consumption of gas was abnormally high at the time, and the Manager (Mr. Magrath) had no available hands to supply their places. When these three men presented themselves next morning, they were informed that the Manager wished to see them before they resumed work. They took no heed of this, and about 9 a.m., without giving any notice, nearly all the hands in the place struck work. A deputation of the stokers, accompanied by Aldermen Cave and Kelleher, waited on the Directors the same day. The men stated they had certain grievances; and the Directors said that if they put them in writing the matter would receive the fullest consideration. All hands went back to work that evening or the following morning.

Subsequently, another interview took place with the same deputation, and subjoined are the various communications received from the men, and the replies given by the Directors resulting from these interviews.

First Communication, March, 1901.	*Directors' Reply.*
1.—The men decline to work under William Buckley, for the disrespectful way he addresses the men, and the petty tyranny he uses towards them. As an instance: On last Sunday, March 3, 1901, one of our men, Cornelius Cronin, had his fire cleaned and almost full, when the foreman, William Buckley, came around, and told the man he had not the fire cleaned; and this man had to take out all the coke and refill it again. The same man had to wait until near twelve o'clock for to eat his breakfast.	1.—The Directors have the appointment of all employees and foremen, and do not intend to make any change. At the same time they will take care that all men should be treated properly; and the Manager will secure that this is done.
2.—If a man wants leave, provided he sends his report in a proper time, we think the men are entitled to get leave.	2.—On proper cause being given, the foreman, if he can provide an efficient substitute, will give leave to go out; such leave not to be frequent; must be applied for before 9 a.m. for day shift, and 5 p.m. for night shift.
3.—We think there should be a limit to every man's work. As, for instance, for the past week or more, the coal wheelers had to wheel coal from No. 4 store to the back of No. 3 house, from the parish of St. Nicholas in Cork to that of St. Michael in the county of Cork; and when they spoke to William Buckley, he told them to put on their clothes and go home. If the men got the coal from the back of No. 3 retort-house, they would have the coal in proper time.	3.—Coal wheelers always wheeled 100 barrels (*sic*) per man the usual distance, and more will not be required. If the distance is longer, additional help will be given.
4.—Every man that was discharged wrongly by Mr. Magrath during his management to be employed again.	4.—The Directors cannot admit that any man was wrongly discharged. At this time of year, of course, the number of men employed is being diminished, as the make of gas decreases.

5.—Any man that took a part in the late dispute shall not be victimized.	5.—The Directors agree to this.
6.—There was an old system always in force that the senior hands always got preference in retort-house and barrow; and we hope it will be continued.	6.—It was always the custom that old hands got the preference in retort-house and barrow work, as long as the Company's interests did not suffer; and no change will be made with the practice.
7.—We consider that it is too much work for two men to wheel the coke out from the new retort-house. Two men are not capable of doing it, because the men are not able to do it except they get more help. Between 20 and 30 men left on account of this place for the last six months.	7.—Owing to the temporary congestion of the working space under the new retort-house, extra hands will be employed until the ground is cleared.
8.—That each gang of men order their own coals, because they could charge the retorts according to the heats. There were cases all the year or more when men would get too much coal in the first two draws, and in the last two draws in the morning they would not get enough of coal; and retorts were often only half charged, which was injurious to the retorts.	8.—The ordering of the coal from store is entirely a matter for the management.
9.—The men want proper tools to work with, such as barrows, and each gang to get a pair of gloves as they always did.	9.—Proper tools will be supplied and a pair of gloves given to each gang.
10.—The men complain very much of the system of payment every Friday night when men get done. At a quarter before six he has to wait in his damp clothes often until half-past six, which is very injurious to the men; and we would wish that the paymaster would come early, and not be keeping the men so late.	10.—The Directors have arranged a new system of paying wages which will obviate delay complained of.
Second Communication, March 15.	*Directors' Reply.*
1.—The men are sorry that they cannot agree to the first question, as they say this man is incompetent to take charge of a lot of men, and they also say that they fear a breach of the peace will be committed which would give more trouble.	1.—The Directors have again to state that the appointment of all foremen and overlookers must rest with them, and they must be judges of the fitness of all employees for their positions. At the same time, the Directors and Mr. Magrath, the Manager, will see that the men are always properly treated by all in authority over them.
2, 3, 5, 9, 10.—Replies are considered all right.	
4.—We consider that there are men wrongly dismissed, not because there is less work now than in winter time, but because they took part in the late dispute; and we ask that those men be reinstated.	4.—The Directors have already stated that no action would be taken against any man owing to his participation in the late dispute, and they have adhered to that undertaking. Any men who were disemployed were put off for good reasons. Some of them discharged themselves by stopping away, as is well known; and it is always necessary at this season to reduce the number of men, owing to the reduced consumption of gas.
6.—We consider all right, but do not understand the following: "As long as the Company's interests do not suffer."	6.—The reference to the Company's interests not suffering means that the custom of giving old hands the preference may have to be departed from in particular cases, if said hands do not behave properly.
7.—In reply to No. 7, if, for instance, when the ground is clear, and the eight-hour shift is resumed, two men are not sufficient to keep the ground clear.	7.—If the eight-hour shift is resumed, all additional necessary help will be provided.
8.—In November, 1899, there was an agreement between the late Manager and the men for each gang of three men to carbonize 7½ tons of coal with 40 retorts. If the men were not able to carbonize their coals, not by the men's neglect, they were to get their full wages. We still adhere to this agreement. The men demand an investigation of the statement that Mr. Magrath made, that before he took charge of the works the men could burn their coal but would not do so, because they would get their full wages. We consider this charge is tantamount to robbery; and we, as workmen, want to clear ourselves of this infamous charge. We also object to boy labour in the works.	8.—As long as the furnaces are kept at proper heats, the management will only be too anxious to give the full quantity of coal—viz., 7½ tons per gang, per day. It is, of course, obvious that if the furnaces are not at proper temperature the management cannot waste coal by putting it into the retorts. The Company's books show that allowances were given for coal not carbonized, in order to make the men's wages up to the standard. Neither the Directors nor the Manager wish to suggest that the men had any intention of wronging the Company, and therefore think no complaint need arise over what is a mere statement of fact. The Company have always employed boys at suitable work, and many of the men at present on the regular staff came in as boys. There is no intention of employing boys to do men's work.

In reply to the last communication of the Directors, Mr. O'Gorman, the Secretary of the Gas Workers' Society, wrote to say that the men accepted the Directors' conditions.

The first thing that should strike anyone on reading the foregoing demands and statements of the men is that their alleged grievances had nothing whatever to do with the cause of the strike. There is no reference in them, nor even an expression of regret, for the misconduct of the three men who left their work without permission, nor to the action of the body of the men in striking without notice for no reasonable cause whatever. When the alleged grievances are analyzed—and the Directors consider it advisable to refer to them in more detail later on—it will be found that there was very little reason in them. It should also be remembered that these alleged grievances were never before brought under the notice of either the Directors or the Manager, and that, in any case, they do not bear at all on the cause of the strike.

Additional References to Men's Statements.

No. 1.—The Directors, on investigation, found that there were no just grounds whatever for the allegation that the foreman, William Buckley, was ever disrespectful to the men, although his temper was often sorely tried by them. He is a most competent man, knows how the work of the retort-house should be conducted, and the Directors have full confidence in him. As to the particular instance respecting the fireman Cronin, the following are the facts: On the occasion in question, Buckley, the foreman, having seen Cronin preparing to clean his fire, left the retort-house for a few minutes, and on his return found, to his astonishment, Cronin filling his fire. Now, as Buckley knew it was absolutely impossible that the fire could have been cleaned in so short a time, he very properly insisted that Cronin should draw the charge from it; and when this was done, the fire was found full of clinkers—proving that it had not been properly cleaned. Scamped work of this kind has very injurious effects on the heats, and consequently on the carbonization of the coal.

No. 2.—One would imagine from this that the men were never allowed leave of absence. They were always allowed leave, provided that proper notice was given, and that their places could be temporarily filled by other men.

No. 3.—The reference to the men having to wheel coal from the parish of St. Nicholas, in Cork, to that of St. Michael, in the county of Cork, might leave the impression that the men had to wheel some miles. The borough boundary line runs through the works. The men are not asked to wheel more than the recognized distance; and additional help is always given if the run is more than usual.

No. 4.—No man was ever discharged wrongfully by Mr. Magrath. Several men discharged themselves by stopping away, and others by misconduct.

No. 5.—The Company have always adhered to this rule, and often against their own interests put off really good men in the slack season, in order to make room for old, but less competent, hands.

No. 7.—There is some reason in this complaint, owing to the temporary congestion of the working space under the new retort-house. The work was certainly more arduous; but the moment the matter was brought under notice, extra hands were put on to clear the ground.

No. 8.—That the men should have the ordering of their own coals is beyond reason. The men can always get as much coal as they want. It is the interest of the Company to have as much as possible used in each shift, provided it is fully and properly carbonized.

No. 9.—This is the first time the men mentioned they had not proper tools; and all that was necessary was at once provided.

No. 10.—This is also a reasonable demand; and the Directors at once made other arrangements for payment, by which the delay referred to could be obviated. Many of the men, however, did not avail themselves of it, and often, through their own fault, kept the paymaster waiting until seven o'clock.

From the foregoing, it will be seen that the Directors gave way to the demands of the men in a generous spirit; and as it was the first strike, they were extra indulgent, believing that the men would recognize the fair manner in which they were treated, and that they would not be so unjust and unreasonable in the future—more especially as, when the Chairman pointed out to the deputation how unjustifiable their conduct was, and the serious consequences their action might have caused to both life and property in the city, they undertook never again to strike without giving proper notice, and that whenever they had any grievances they would submit them to the Directors before taking any further action, and this in the presence of Alderman Cave and Alderman Kelleher. But the liberality shown to the men had not the desired result. Owing to their conduct, the work was totally disorganized during the week following the first strike; but even that the Directors overlooked. Later on a decided improvement, it is true, was manifest in their behaviour, though a spirit of insubordination and want of goodwill in their work was still shown by certain stokers, and which culminated in the present strike.

THE PRESENT STRIKE.

On May 16, the Manager's attention having been called to certain retorts in the new building which were considerably overheated through careless charging, he asked the four men responsible to put one additional scoop in each retort—a matter that would not have taken more than two minutes, and which was the only way of getting the temperature down quickly and preventing injury being done—but they refused. He again asked each individually, but with the same result; whereupon he told them that as they would not work they had no business in the retort-house. The Manager then brought in four other men to do the necessary work.

The reason given by the men for their refusal to obey the Manager was that they had already put in their quantity of coal. This the Manager denied, and showed them by figures that their statement was incorrect. But even if what the men stated was true, the work—a matter of two minutes—was necessary to save the Company's property from injury. They made no demand for extra payment, which would have been granted, if just; but they absolutely refused to obey reasonable orders. It is obvious that employers of labour could not possibly retain any men in their employment who would not give a helping hand in emergencies of this kind.

Within one hour or so after this incident, the men struck work in a body. Mr. O'Mahony, the Secretary of the Company, was communicated with, and on reaching the office at the works sent a message to the Secretary of the Gas Workers' Union (James O'Gorman, stoker) to come to him; and the reply he received from this man was that he would not come, that it was the Secretary's business to go to him. Mr. O'Mahony then went up to the stokers' lobby, where the men were assembled, and tried to reason with them. Soon afterwards, Mr. Harrington, a Director of the Company, arrived at the works, and he also used every effort to bring the men to their senses. He pointed out the

serious consequences their conduct might cause to the public, reminded them of the promise they made only a couple of months previously—never again to strike without giving proper notice and first submitting any grievance they might have to the Directors—and requested them to go back to their work. If the men who disobeyed orders thought they had any grievance, they could bring the matter before the Directors. "But the men have been dismissed permanently" was their reply; and when Mr. Harrington informed them that he would consider them as merely suspended, they said they would go back to work if they were at once reinstated, but not otherwise, or words to that effect. Mr. Harrington said he could not allow this, whereupon all the men left the works.

The supply of gas then failed almost entirely for a few days; and the citizens will remember the enormous inconvenience caused to all classes of the community. Strenuous efforts were at once made to cope with the difficulty, and fresh, though untrained, hands were secured; some of the clerical and outside staff and the Manager himself taking part in the stoking. A partial supply, after a few days, was resumed. The carters also went out with the stokers, which added to the difficulties of the Company, owing to the accumulation of coke, which, at that time, could have been sold, owing to the active demand, if it could have been delivered. Even now what can be delivered has to go out under police escort.

The strikers picketed the works, and by intimidation and assault so frightened the Company's men that several gave up work. It was found necessary, therefore, in order to keep the works going, to feed and house the men within the works; and even then considerable trouble was experienced in getting in food. When the supply of gas was nearly normal again, the second largest gasholder at the works was totally destroyed; and as No. 5 (the largest) holder was out of use and down for repairs at the time, the situation looked almost hopeless. But owing to the ability and the marvellous energy and efforts of the Manager, Mr. MacGrath, the work was still carried on. As the destruction of the gasholder is to be the subject of litigation, the Directors do not make any further reference to it here.

Since then the Company have done all in their power to keep up an ample supply of gas; and they would have no difficulty in doing so, were it not for the action of the strikers, who, by the continuous circulation of inaccurate statements and by intimidation, not only prevent many willing hands from giving help, but also so frighten by indirect means the men actually at work, that several are forced to leave from time to time, which, of course, handicaps the management severely. To give some idea of the length to which the strikers have gone, the following publications should suffice:—

Letter of James O'Gorman to the Editor of the "Wexford Free Press."

CORK GAS STRIKE.

Gas Workers' Society Room,
67, South Main Street, Cork, June 5, 1901.

Sir,—Through the columns of your popular journal, I would like to bring under the notice of the people of Wexford the great injury their friends are doing to the workers of Cork. On the 16th of May a strike took place in the Cork Gas-Works, not for an advance of pay or shorter hours, but in sympathy with four of our men who were wrongly dismissed; and no men could be got in Cork to fill our places. But men came from Wexford. Now, we would appeal to the men of Wexford who have friends working in the Cork Gas-Works, to ask their friends to return home and leave this dispute come to a close. The longer these men remain in Cork, the further away we will be from settling. I would appeal to the workers of Wexford to think on what their own people have suffered. Remember the people on the Coolroe Estate, who fought for their homes. We are doing the same. Do not let the name of a Wexford man be held up to reproach in Cork, but rather let us look on the men of Wexford as we always did—men ready to sacrifice everything for their country's cause.

On behalf of the men,

JAMES O'GORMAN, Secretary.

Advertisement in Local Papers.

CORK UNITED TRADES AND LABOUR COUNCIL.

GAS WORKERS' STRIKE.

Mechanics' Hall, Grattan Street.

Fellow-Citizens,—In appealing to you for subscriptions to the fund for the support of the striking workers, their wives, and children, we think no apology is needed. The facts of the case are already before you. We feel confident that all honest citizens will come to the rescue of these men in their gallant effort to resist the latest exhibition of capitalist aggression.

Subscriptions may be sent to any of the undersigned:—

W. CAVE, President.
C. O'LYHANE, Sec. Strike Committee.
P. CREEDON, Treasurer.

Or to any member of the Strike Committee—Messrs. Coates, Donohue, Enright, Field, Forde, Hegarty, Havaner, Kelleher, Long, Murphy, Madden, M'Carthy, Nason, O'Mahony, Punch, Twomey.

Placard Posted Throughout the City.

CORK UNITED TRADES AND LABOUR COUNCIL.

GAS WORKERS' STRIKE.

A great Public Meeting will be held next Sunday, the 30th inst., on the Grand Parade, at 8 p.m., to hear the case for the workers, to proclaim the solidarity of the cause of labour by enlisting the support of all working men on their behalf, and to focus public opinion on the serious inconvenience and danger already amply demonstrated to exist, arising out of the production of coal gas by incompetent hands.

Alderman W. Cave, President of the Cork United Trades and Labour Council, will preside.

City bands will attend.

Working men of Cork assemble in your thousands, and by your presence show to the enemies of labour that you are determined to maintain the strikers in their effort to resist the encroachments of the home-made capitalists.

Working men, unite! You have nothing to lose but your chains, and the whole world to gain.

C. O'LYHANE, Secretary of the Strike Committee.

Labor Omnia Vincit.

There was also a grossly libellous handbill circulated about the Manager, Mr. Magrath, respecting his treatment of the outdoor staff, to which the Directors take the greatest exception. No complaint of bad treatment by him was ever made to the Board by any of the men during the many years he was their Manager. Quite the contrary was the case. All worked most cordially and well under his direction; and there was never a more just official in charge of men.

It will be clear to anyone who carefully studies the facts, &c., given in these particulars, that there never was, in the history of strikes, a more unjustifiable strike than the present one. It should also be added that the Company have always treated their employees in a generous manner, given them substantial sick allowance, and, in case of death, funeral expenses, and help to their families, although the men were asked to make no contributions to these objects out of their wages.

As to the work demanded from the men. In the old retort-houses they were supposed to carbonize 2 tons 10 cwt. of coal per man daily; and in the new house, where there was less labour in carting coke, 2 tons 13 cwt. As a matter of fact, however, the returns for some months show that the amount carbonized was considerably less; yet the men were paid as if they had worked the full quantity—another instance of the liberality of the management.

It must be mentioned that the men questioned the accuracy of the Company's weighing, whereupon Mr. Magrath, the Manager, offered to pay the wages of a man of their own selection to check the weights at the scales; but they refused the offer. The *bonâ fides* of this contention of the men can now be judged.

The Directors think that the main points in the history of the strike have now been fully set forth; and it only remains to refer to the efforts made by some prominent citizens to effect a settlement. Several interviews took place with this object. The men express their willingness to come back in a body on the same terms as they enjoyed before they went out on strike, admitting thereby that they have no grievance to complain of; but they demand that all the new hands taken in by the Company during the emergency should be first dismissed. As the Directors promised to give permanent employment to all who came to their assistance in their difficulty, as long as they gave satisfaction, they cannot, of course, entertain such a demand; nor could they ever hope to obtain help again if they now broke faith. The Directors consider that the majority of the men were led astray by a small number, and would act in a reasonable manner if again employed; and therefore they are willing, and have already so stated, to consider favourably individual applications for work as vacancies arise. The Directors informed the Lord Mayor and Mr. Dunn last week that they would take on twenty suitable men at once, and twenty more in a month, in this way.

In conclusion, the Directors have to express their thanks to consumers for their indulgence in the Company's difficulties, which, they think, this statement will show were of no ordinary kind, and for which they were in no way responsible; and they hope for a continuance of their kindness as long as the difficulties continue.

INTENSIFIED GAS LIGHTING AT HERNE BAY.

Herne Bay means to take front rank among fashionable watering-places, for as one (and not the least) of the many improvements made at this now popular seaside resort has to be recorded the first installation of any magnitude along the coast of intensified gas lighting; the promenade being last week illuminated by forty of the Welsbach Company's shadowless lanterns, fitted with their self intensifying Kern burners, giving a light of 300 candles each. These lamps are placed 40 yards apart along the promenade, which is about 1½ miles long, while along the gardens and at the entrance to the pier five extra lamps are fixed, each fitted with three burners, and giving a light of 900 candles. Great interest is being taken by the visitors in this improvement, for it has converted the handsome promenade into a brilliantly illuminated walk, and has thrown the few electric lamps on the pier quite into the shade. Much credit is due to Mr. C. V. Bennett, the Engineer and Manager of the Herne Bay Gas Company, for the successful carrying out of the installation, for which he has laid a special main from the works to the sea-front to supply the new lamps, conveying gas at a uniform pressure of 35-10ths. The system was adopted on the advice of Mr. Henry Woodall, of the firm of Messrs. Corbet Woodall and Son.

RHYMNEY GAS AND WATER WORKS ARBITRATION.

The Award.

Mr. Charles Hawksley has given his award in the arbitration between the Rhymney and Aber Valley Gas and Water Company and the Rhymney Iron Company, Limited, which was held in London in January and February last, to determine the price to be paid by the Gas and Water Company to the Iron Company for that portion of their works and property which was used for the supply of water for domestic purposes; the Company having obtained compulsory power to acquire this. The Umpire awards the sum of £11,197 as the amount of purchase money, to be paid to the Rhymney Iron Company by the Company, on the understanding that the rent payable in respect of the Iron Company's leasehold interests is £25 per annum.

The Barnsley Town Council last Tuesday confirmed the purchase, in addition to the existing agreement, from the Dewsbury and Heckmondwike Water Board of 400,000 gallons of water daily, for 100 days, at 7½d. per 1000 gallons.

At the first meeting of the Aspatria, Silloth, and District Water Board last Wednesday, Mr. W. Williamson was elected Chairman, and Messrs. Pickering and Crompton, Whitehaven, were appointed Engineers to carry out the works, at an inclusive fee of £1400, which, with the parliamentary expenses, will bring their charges up to £1800.

PROJECTED LARGE GAS-WORKS EXTENSIONS AT LEICESTER.

At a Special Meeting of the Leicester Town Council last Tuesday, the Gas and Electric Lighting Committee recommended—in view of the increasing consumption of gas (which had advanced since 1878 by no less than 1,212,345,000 cubic feet, or 234 per cent.), and as the Engineer (Mr. Alfred Colson) estimates that at the present rate of increase new works will be needed in about five years, and as it would require from twelve to eighteen months to design these and prepare the necessary drawings, specifications, &c., and their erection will take three years at least—the purchase as a suitable site for new works of 121 acres (approximately) of land situate in the parish of South Thurmaston, abutting on the Midland Railway, at £150 per acre.

The MAYOR (Alderman Lennard), in moving the adoption of the recommendation, said the question as to whether the growth of the town and the demand for gas would continue was one they could not answer with certainty; but looking at the trades, the past of Leicester, and the tendency of large towns to grow, he thought they were safe in providing for a largely-developed Leicester of the future. As to whether the demand for gas would increase he felt more certain. They had the electric light, he knew, but the Gas Department had never ceased to grow since the introduction of the electric light. One did not interfere with the other. Seeing that they had to extend their works, the Committee had to consider in what direction that was possible. They could not grow at Aylestone. He felt he could draw on the confidence of the Gas Committee to act on his own judgment and secure a site. He afterwards told his Committee about it; and they had endorsed the step he had taken. The price at which he bought the land was £150 per acre. He took the precaution to get a valuation of the site; and he was pleased to say that the amount confirmed him in his judgment of the value of the land—the valuer placing it at a great deal more than they were asked to pay for it.

Mr. EDWARDS seconded the resolution.

Alderman MARSHALL criticized the motion at length. He admitted that no one could be more safely trusted than the Mayor to gauge the probable extension of the Gas Department; and if this purchase of land were recommended from that standpoint only, and with figures to justify it, he (Alderman Marshall) should vote for it. But in its present form, and with the arguments which the Mayor had put forward, he should feel himself compelled to vote against it.

Alderman WOOD supported the Gas Committee's recommendation, and thought it one of the best that had been put before the Council for many years.

Mr. YEARBY said the Council ought to have further time for considering this matter before it was put to the vote. He objected on principle to Chairmen of Committees purchasing land and then coming to ask the Council's approval, unless the purchase were provisional.

The discussion was carried to considerable length; but in the end the motion was passed without opposition.

DISASTROUS GAS EXPLOSION IN EDINBURGH.

Loss of Five Lives.

As will have been seen from our "Notes from Scotland" last week, a disastrous explosion of gas occurred in Tod's Mills, Stockbridge, Edinburgh, on July 16, resulting in the deaths of five men. The subject is again referred to in the "Notes" to-day, having been the subject of conversation at a meeting of the Edinburgh and Leith Gas Commission on the 29th ult. In addition to this, an official inquiry under the Fatal Accidents Inquiry (Scotland) Act, 1895, was held by Sheriff Rutherfurd and a Jury in Edinburgh, last Friday, at which evidence was adduced which throws further light on the cause of the accident.

Mr. *William Tod*, one of the partners in the firm, said that about six years ago they introduced a gas-engine for the purpose of driving a flour-hoist; but in May last they substituted two electric motors for it. As a matter of convenience, the gas-engine was allowed to remain on the premises till about the middle of July. On Tuesday, the 16th, Mr. Stewart, the purchaser of the engine, sent men to remove it. Witness was standing in the room of the office, and all at once two violent explosions occurred, the floor of the office heaved upwards, and then he heard a great crash of glass. He ran down to the yard, opened the mill door, and found the mill on fire. He saw the men who had been injured coming out all bleeding. This was at about half-past twelve o'clock. The Fire Brigade was called, but the premises were almost completely burned. There had previously been no trouble with the engine, and the only reason for its removal was that electricity was more modern. The gas-meter was situated 6 or 7 feet away from the engine. He was satisfied that the explosion was caused by gas, and not by flour dust. The engine could have been removed without touching the main pipe at all.

Mr. *Alexander Dodds*, a partner of Mr. Stewart, who had bought the engine, said that Muirhead, the foreman, who went with the men to do the work, was a man of considerable experience. He was paid 45s. a week. Harper, one of the men under Muirhead, after the explosion, made the remark to him: "This is a terrible business. I cannot account for it, unless it was yon dust." Harper, who said that he had a cold, and that the dust in the mill made him cough, never mentioned gas.

Colin George Wilson, a miller in the employment of Messrs. Tod Bros., gave evidence that one of the men engaged in the removal of the engine asked him for a chisel and a lamp. There was only an 8-candle electric lamp in the engine-house, and the man complained that he and his comrades could not see. Witness gave the lamp, and went into the place, where four or five men were at work. Just before the explosion occurred, Mr. Thomson, the mill foreman, asked for a shifting key. Witness, along with other three men, was on the floor above. The room was filled with flame, and he was knocked down. There was not enough flour dust to cause an explosion. When last in the engine-house, before the explosion, he did not smell gas. The engine had not been in use for many weeks before. It was he who stopped the gas at the meter when last the engine was working. The stopcock must have been shut when he was in the place, otherwise he would have smelt gas. The workman he had already referred to had some keys and chisels, and he expected the shifting key was wanted to use on some of the nuts on the engine which the other keys would not fit.

Mr. *John Bennet*, of Messrs. Archibald Bennet and Co., engineers, St. Leonard Street, Edinburgh, said he had made an examination of the engine-room where the disaster occurred, with a view to ascertaining the cause. The stopcock between the meter and the engine did not appear to have been recently opened. Part of the 3-inch service-pipe was wanting. This disconnection, in his opinion, had been made before the explosion. Immediately it was unscrewed there would have been a great rush of gas into the engine-room, which was a somewhat contracted chamber. His explanation of the disaster was that the supply-pipe to the meter had been disconnected. For the purpose of removing the engine, there was no need in any way to interfere with that connection. Upon the brass coupling between the meter and supply-pipe from the main there were two marks, which indicated to him that, the screw of the coupling being somewhat stiff, someone had started the unscrewing with a hammer and chisel until it could be continued with the hand.

Mr. *J. E. Cruickshank*, connected with the firm of Crossley Bros., Limited, said, as the result of an inspection of the scene of the disaster, he formed the opinion that there had been a gas explosion through the uncoupling of the pipe from the main to the meter. The brass coupling produced had two marks upon it, which indicated to his mind that either the men had not a key to fit it, or that the coupling might have been stiff. The meter had been in use for some years, and the men had probably procured a hammer and chisel, and forced the coupling round. The marks appeared to have been recently made, as the metal was quite fresh. The coupling between the engine and the meter had been safely removed. He found the stopcock shut. The meter itself appeared in good order. There was no reason why the inlet-pipe should have been disconnected.

Mr. *Alexander Masterton*, Station Manager at the Edinburgh Corporation Gas-Works, said he found the meter to all appearance in good order, and the stopcock was all right. He noticed that part of the service-pipe leading into the meter was wanting. It appeared to him to have been burnt away. The coupling belonged to the Gas Commissioners, and nobody had a right to interfere with it without communicating with the Gas Commissioners. He had no communication from anyone asking liberty to sever the connection with the inlet-pipe. It was the rule, when gas-engines were to be removed, to send word to the Commissioners to have the gas shut off at the main. It was a very necessary proceeding, notwithstanding the stopcock at the meter might be shut off. Supposing it was perfectly tight, there would be no danger in disconnecting the pipe from the outlet of the meter with the gas-engine. The Commissioners had no jurisdiction over that, and parties could do it on their own responsibility. In Edinburgh, Leith, and Portobello there were 497 gas-engines; and, so far as he was aware, there had never been an explosion before.

Sheriff RUTHERFURD said he thought the Jury must come to the conclusion that the explosion was due to the fact that the pipe communicating between the meter and the main had somehow become opened. He suggested that their verdict should be to the effect that the deceased were injured by an explosion due to a great escape of gas from a pipe connecting the meter with the main, and that the cause of death was shock consequent on burning by the explosion of gas.

The Jury adopted this verdict.

ELECTRIC LIGHTING NOTES.

The Lancaster Town Council have given authority for the extension of the electricity works at a total cost of £22,232.

The Electricity Committee of the Manchester Corporation have come to the conclusion that the price of the current must be raised ½d. per unit all round; and they will recommend the Council accordingly.

The Tonbridge District Council have received the sanction of the Local Government Board to a loan of £20,400 for electricity supply works; the term of repayment to extend over a period of 25 years. Tenders for the works, amounting to £17,374, have been accepted.

The Gas and Electricity Committee of the Leicester Town Council report that the total output of electricity from the central station for the half year ending June 30 last was 641,650 units, as against 489,055 units in the corresponding period of last year; being an increase of 152,595 units, or 31·20 per cent.

The Borough Accountant of Wakefield has issued his annual abstract of accounts. It includes the figures referring to the Electric Lighting Department for the year to March 31 last. The income is given as £4198, and the expenditure as £3735—showing a balance of £463. The expenditure covered the payment of £1773 sinking fund and interest. The sale of current represented 18,962 units at 6d., 183,212 units at 4½d., and 697 units at 3d.

The members of the Birmingham City Council had before them last Wednesday a proposal by the Electric Lighting Committee that the Finance Committee should be instructed to borrow £128,890 for a new generating station on a site acquired for the purpose in Summer Lane, and also £75,000 for the laying of new mains, with subsidiary stations, in outlying districts. The new station is required both for tramway and general lighting purposes. In moving the adoption of the proposition, it was mentioned by Mr. Johnstone that the Committee would, within the next few years, have to ask the sanction of the Council to the borrowing of a total of £239,200. In the discussion, objection was taken to the site for the station, and to the report itself on the ground that it was exceedingly crude. One member had not much confidence in the Committee, because in May last the Council were told they were going to spend £6200 in laying new mains, whereas they had spent £9349. If this was a sample of the way the Committee's estimates were going to be exceeded, the Council, it was contended, could not place much reliance on the figures before them. However, the recommendation was carried by 36 votes to 11. The Council also

sanctioned, after a short explanation, an instruction to the Finance Committee to borrow £65,084, the amount expended on the electric supply undertaking in excess of the authorized capital. This included £23,000 for the purchase of the Summer Lane site, £20,000 for plant and machinery in Water Street, and £15,000 for engines, boilers, and dynamos which had been ordered to meet present demands.

There is a deficiency on the accounts of the Bristol Corporation Electricity Department for the year ending March 25 last, and the Committee do not anticipate any material improvement this year. The number of consumers on March 25 was 1507; being an increase of 292 during the year. The total connections to the mains are equivalent to 119,615 30-watt lamps (as compared with 91,117 at the corresponding period of last year) made up as follows: 9389 taking energy at the power rate, 104,985 taking energy at the lighting rate, and 5241 representing the public street lighting. This is an aggregate increase equivalent to 28,498 lamps, as follows: Power connections, 6619; private lighting, 21,799; public lighting, 80—the increase in private lighting alone exceeding the total additions of any previous year. The number of units sold was 2,191,559; being an increase of 379,048. The use of electric motive power has continued to increase; and the Committee state that they are pleased to find that the sale of current for this purpose has more than doubled. The gross receipts amounted to £37,398, and the expenditure to £25,726—leaving a gross profit of £11,672 available towards payment of dividends on stock, interest on loans, and bankers' overdraft, £7327; repayment of money borrowed, £6811; the new Avonbank works preliminary expenses, £90—£14,229. The credit balance at the commencement of the year was £3062, which has met the deficiency on this year's working of £2557, and left a balance to carry forward to next year's accounts of £505. The deficiency is attributable to the largely-increased price of coal (this item alone is said to have increased the cost of generation by above £4000), to the interest and contribution to the redemption fund for the unremunerative capital at Avonbank, amounting to upwards of £900, and to the management expenses being high, although less in proportion than last year, on account of the salaries of members of the staff engaged almost exclusively on new works being charged to revenue. The Committee think it right to state that they do not anticipate a material improvement in the net financial result of their trading during the current year, as, although the price of coal has been considerably reduced, the unremunerative outlay is being increased, and the advantage of this outlay will not be felt until the Avonbank works are in operation.

NEW PUMPING MACHINERY FOR GAINSBOROUGH.

The new pumping machinery for dealing with the water from the recently completed boring at Gainsborough is now well in hand; the contract having been placed with Messrs. Combe, Barbour, and Combe, of Belfast, in accordance with the recommendation of the Consulting Engineer, Mr. Percy Griffith, Assoc.M.Inst.C.E., F.G.S. It may be remembered that the Urban District Council called in Mr. Walter Hunter, M.Inst.C.E., to report generally upon the tenders received, and that he fully supported the advice given by the Council's Engineer in this respect. The amount of the tender was £6150. The engine is to be of the vertical compound inverted type, having cylinders 24 and 40½ inches respectively in diameter and 3-feet stroke, operating force-pumps fixed immediately below the bed of the engine. The borehole pump is to be double acting, with barrels superimposed—that is, of the "concertina" type—driven by steel rocking levers or bell cranks at the surface. It will be fixed at the lowest possible depth allowed by the borehole tubes—viz., 300 feet; and, as a test up to 30,000 gallons per hour has lowered the water only 100 feet from the surface, it is probable that the increased depth will secure an ample reserve of water considerably in excess of the present requirements of the town. The pumps are of an entirely new design, being an adaptation of Ashley's patent multiple-valve system, which is in use at the Brighton Water-Works and elsewhere, and will be made by Messrs. Glenfield and Kennedy, of Kilmarnock. The capacity of the new machinery is to be from 40,000 to 60,000 gallons per hour; the intention being to run in the first instance only twelve hours a day, which period can be extended as the demand for water increases. The duty guaranteed by the Contractors is 97,563 foot-pounds in water lifted per pound of steam used in the engine; and Mr. Hunter, in his report, has estimated this to represent an annual cost for interest on capital outlay—including the cost of the engine-house, calculated at £2000—sinking fund, and fuel, of £1692 per 280 million gallons of water (about one year's consumption) lifted 400 feet. This works out at 1·48d. per 1000 gallons. A Green's economizer is at the same time to be fitted to the existing boilers, and consequently the above results, which are based upon an evaporation of only 8 lbs. of water per pound of coal, will, it is expected, be considerably improved upon in actual practice.

Rothwell Water Supply.—Colonel W. R. Slack, R.E., recently held an inquiry in the Council Chamber, Rothwell, relative to an application by the Urban District Council to the Local Government Board for sanction to borrow £9560 for the purposes of water supply, including the construction of a reservoir with a capacity of more than 100,000 gallons. The Clerk (Mr. F. W. Bull) stated that Dr. More, the Medical Officer of Health, had urged the great need of an efficient water supply for the town; and the Council had already taken steps, by the acquisition of land and water rights, to provide it. Mr. F. Barlow, the Chairman of the Council, said a canvas had been made of the town, and it showed that there were 336 houses or buildings which had a good supply of water, 126 an unfit supply, 136 an insufficient supply, and 297 houses and property which had no supply of drinking or flushing water whatever. It was pointed out that 86,000 gallons per day would be required for the parish, and a test of the stream proposed to be drawn upon showed that it would produce 140,000 gallons. The Inspector said that, from the evidence he had heard, he considered it was a very desirable thing that a water supply for the parish should be hurried on as rapidly as possible; and he would urge upon the Local Government Board the importance of the matter.

THE LONDON WATER BILL.

The Bill introduced by Sir J. Blundell Maple to "vest the undertakings of the London Water Companies in a single public authority, and for other purposes," was issued by His Majesty's Printers last Tuesday. We were able, in the "JOURNAL" for that day, to give an indication of the scope of the measure; but we can now deal more fully with its provisions.

The Bill is prefaced by a memorandum explaining its objects. It is in the following terms: "This Bill has been drafted with the object of meeting the wishes of water consumers who desire that the water supply of the Metropolis and adjacent districts should be vested in a public central authority, and not remain in the hands of eight private Water Companies. The holders of all debenture stock and shares in the existing Companies to be given the same income as they at present receive, in a new water stock to be created under this Bill, and where a prospective increased value exists the same to be actuarially provided for. All economies of management, better supply, and reduced cost of water and service will be for the benefit of the consumers."

The preamble runs as follows: "Whereas it is expedient that the duty of supplying water within the area (hereinafter referred to as 'the Metropolitan water area') now supplied by the eight Water Companies mentioned in the first schedule to this Act (hereinafter referred to as 'the scheduled Companies') be entrusted to a single public authority, with the powers and subject to the provisions in this Act contained: Be it therefore enacted," &c. The short title is the "London Water Act, 1901."

The Bill is divided into six parts, headed as follows: (I.) Water Council; (II.) Transfer to Water Council; (III.) Consideration for Transfer; (IV.) Creation of Water Stock; (V.) Directors, Officers, and Servants; (VI.) Miscellaneous. There are altogether 44 clauses and three schedules.

I.—*Water Council.*

For the execution of the Act, there is to be established a Council, whereof the members are to be a body corporate by the name of the London Water Council (in the Act referred to as the Water Council), having perpetual succession and a common seal, with power to hold lands without any licence in mortmain. The members of the Council, exclusive of the Chairman and Vice-Chairman, are to be appointed by the undermentioned authorities (in the Act referred to as "constituent authorities") from the members of their own body respectively as follows: Sixteen by the London County Council; one by the Common Council of the City of London; one by the Council of each of the Metropolitan Boroughs; four each by the Councils of the counties of Middlesex, Kent, Hertford, Essex, and Surrey; and two each by the Conservators of the Rivers Thames and Lea. The appointments are to be made by each authority at a meeting to be held within two months before Dec. 1 in the year 1902, and in every subsequent third year; and the name of every member appointed shall in the case of the first appointment be returned by the Clerk of the constituent authority to the Clerk of the London County Council, and in the case of subsequent appointments to the Secretary or Clerk of the Water Council. A member ceasing to be a member of the authority which appointed him does not on that account cease to be a member of the Council.

Members are to come into office on the 1st of December next after the date of their appointment, and are to hold office for three years. A member may resign by sending notice in writing of his resignation to the Chairman, Secretary, or Clerk of the Council. A member who becomes bankrupt or compounds with his creditors, or becomes lunatic or incapable of managing his own affairs, or holds any office or place of profit under the Council, save as permitted by the Act, or is concerned or participates in the profit of any contract entered into by the Council, is to cease to be a member thereof, and his office will thereupon become vacant, subject to the following exceptions: A member shall not vacate his office by reason of being a shareholder in any company entering into any contract with the Council, or by reason of being interested in any sale or lease of lands or any loan of money to that body. Nevertheless, a member is not to be entitled to vote in respect of any contract with the Council made by any company in which he is a shareholder, or in respect of any question connected therewith, or of any such sale, lease, or loan as before mentioned; and if he does so vote, his vote is not to be counted. A member is also to vacate his office if he absents himself from all meetings of the Council for six consecutive months, unless the Council resolve that it is expedient that he should not vacate his office. A casual vacancy occasioned by death, disqualification, resignation, incapacity to act, or otherwise, is to be filled within three months after its occurrence by the authority which appointed the vacating member; but the person appointed is to hold office so long only as the person whose place he takes would have been entitled to do so.

In addition to the ordinary members of the Council, there are to be a Chairman and a Vice-Chairman appointed by the Local Government Board, and the Council may, if they see fit, appoint from among their members a Deputy-Chairman. There is to be paid, out of the revenues of the Council, to the Chairman a salary of £3000 per annum, to the Vice-Chairman a salary of £1500 per annum, and to the Deputy-Chairman (if any) a salary of £500 per annum. The Chairman, Vice-Chairman, and Deputy-Chairman are to be the Chairman, Vice-Chairman, and Deputy-Chairman respectively of the Executive Committee constituted by the Act.

The powers and duties of the Council will comprise: The execution of the provisions of the Act and of the provisions now in force of the Acts and Charters relating to the undertaking of each of the scheduled Companies; the improvement of the water-works of those Companies, and the extension, so soon and so far as practicable, of a constant supply of water throughout the Metropolitan water area; the making and enforcement of bye-laws for the prevention of waste of water; the conveyance to, and distribution within, any part of the Metropolitan water area of water, without regard to the source whence it is derived; and, generally, the exercise within any part of that area of any powers which any of the scheduled Companies could, but for the Act, have

exercised within their own district. All the powers of the Council, except those relating to borrowing money, levying contributions from the constituent authorities, appointing a Deputy-Chairman and members of the Executive Committee, and promoting and opposing Bills in Parliament, are to be exercised by an Executive Committee, consisting of the Chairman, Vice-Chairman, and Deputy-Chairman (if any) of the Council, and of ten members to be annually appointed at the first meeting of the Council after the 1st of December in each year by and from the members of the Council. The members of the Committee are each to be paid a salary of £250 per annum; and any member who is absent from more than six consecutive ordinary meetings is to vacate his office, unless the Executive Committee resolve that it is expedient that he shall not do so. The Committee are to be empowered to appoint Sub-Committees from other members of the Council, and may delegate any of their powers to them; but all their acts are to be subject to confirmation by the Committee.

II.—*Transfer to Water Council.*

On and from the appointed day, the undertaking of each of the scheduled Companies is, by virtue of the Act, without any conveyance or other deed, to be transferred to, and vested in, the Council for all the estate and interest therein of each of the Companies respectively; and it is to be held by the Council for the benefit of the inhabitants of the Metropolitan water area, and subject to the provisions of the Act. Until the appointed day, the Companies are to maintain their works in good repair and condition, and continue to carry on business in the same manner as hitherto; but they are not to appoint any salaried officer, or grant any pension or gratuity to any director, officer, or servant, or enter into any contract involving the expenditure of more than £200, without the consent in each case of the Local Government Board.

On or before the appointed day, all books and documents whatsoever of each of the Companies are to be transferred to the Council; but it shall be lawful for any Company, or any person on their behalf, to have access to such books and documents at all reasonable times for the purpose of inspecting, copying, or making extracts from them.

The Companies are to pay all interest accruing due up to the appointed day on any debentures, debenture stock, or mortgages issued or granted by them; and are to be entitled to pay for the period between their last payment of dividends respectively and the appointed day such dividends on all ordinary or preference shares or stock as they would respectively have been entitled and in a position to pay if the Act had not been passed.

The Companies are to pay, discharge, and satisfy all debts, liabilities, and obligations which, in the ordinary course of business, would fall to be paid, discharged, or satisfied before the appointed day; and the Council are to pay, discharge, and satisfy the bond or mortgage debts and all other debts, liabilities, and obligations of the Companies. Any debts secured by bond or mortgage on the undertaking or revenue of any of the Companies are to be secured in like manner on all the property by the Act transferred to the Council, and on the income of the Council; and the mortgagee or other person secured shall have the same rights and remedies, as nearly as may be, against the property and income of any of the Companies as if the Act had not been passed. Any question arising between the Council and any of the Companies in this respect is to be referred to and determined by a single arbitrator, to be appointed, on the application of either party, by the President of the Institution of Civil Engineers.

On and from the appointed day, all the provisions of any Act relating to the undertaking of any of the Companies are to apply to such undertaking in the hands of the Council, in the same way (subject to the provisions of the Act) as they would have applied to such undertaking in the hands of the Company to which such undertaking previously belonged; and the Council are to exercise the same powers, have the same rights, and be subject to the same obligations as such Company would have had, exercised, and been subject to if the transfer of the undertaking to the Council had not taken place. All bye-laws, rules, regulations, and scales of water charges made or enforceable by any of the Companies are to continue in force until repealed, altered, or superseded under the powers conferred by any Act of Parliament. It is provided, however, that the charges for water supplied for domestic purposes which are actually in force immediately before the appointed day are not to be increased without further authority in that behalf from Parliament.

III.—*Consideration for Transfer.*

In consideration for the transfer of the undertakings, the Council are to issue, without fee or charge, to every holder of debentures or debenture stock, of shares or stock bearing a fixed preferential dividend, of ordinary shares or stock on which the maximum statutory dividend was paid for the financial year of the Company next before the passing of the Act, and of ordinary shares or stock on which a dividend at less than the maximum statutory rate was paid for such year, an amount of the water stock to be created under the Act sufficient to produce the same income as was produced in each case in such financial year, with the addition, in the last case, of such a further amount of water stock in respect of prospective increase of dividend as may, in default of agreement between the Council and the Company before the appointed day, be determined by an arbitrator, to be appointed, on the application of either the Council or the Company, by the President of the Institution of Civil Engineers. In reckoning the income of share or stock holders in the New River Company, no account is to be taken of any income received by them from any property which is not by the Act transferred to the Council; and any difference arising in this respect between the Council and the Company is to be determined by an arbitrator appointed in the manner just mentioned.

IV.—*Creation of Water Stock.*

For the purpose of providing the consideration for the transfer of the undertakings of the Companies, the Council are forthwith to create a sufficient amount of stock, to be called London Consolidated Water Stock, bearing interest, payable half yearly, as from the appointed day, at the rate of £3 5s. per cent. per annum. If at any time the Council have reason to apprehend that their income will be insufficient to meet the interest on the stock and other payments falling to be made out of revenue for the year, they may cause the amount of the deficiency to be estimated, and may raise that amount by contributions from the constituent authorities other than the Conservators of the Rivers Thames and Lea. For the purpose of obtaining payment of the sums to be contributed by the several contributory authorities, the Chairman of the Council is to send to each contributory authority a precept for payment of the amount to be contributed by them. The precept is to require the contributions to be paid to the Treasurer of the Council out of the fund or rate applicable to the general expenses of each authority at the time or times appointed by the precept; except that, in the case of a County Council, the precept is to require the contributions to be raised as special expenses on the part of the county within the Metropolitan water area, and they are to be raised accordingly. If the precept of the Council is not complied with, two Justices or a Police Magistrate having jurisdiction in the area of the authority in default may, on the complaint of the Chairman of the Council, issue and send to the Treasurer of the authority in default, a warrant requiring him to pay to the Treasurer of the Council, besides the sums due under the precept, the additional sum mentioned in the warrant; the same being calculated to the proportion of one shilling to every ten on the sum mentioned in the precept. Until payment thereof, the Treasurer of the Council is to have, in respect of the warrant, all the powers for recovery which are given against a Guardian or Overseer for the recovery of rates and surcharges; and, in addition, the Council may recover the sums due by action or other proceedings in any Court of competent jurisdiction against the authority in default. If any difference arises concerning the precept, it is to be referred to a single arbitrator under the Arbitration Act, 1889; and that Act is to apply as if the arbitration were pursuant to a submission.

With a view to supply funds to the Council immediately on their entering upon the undertakings of the Companies, and before the receipt of their water-rents, and with a view to enable them punctually to pay the interest from time to time accruing due on the water stock, and generally with a view to enable them to conduct their business on favourable terms, the Bank of England may from time to time, on the request of the Council, place to their account at the bank such sums as the Council may require for carrying on their business, provided that the total amount due from the Council to the bank at any one time does not exceed £500,000. The sums so borrowed and reborrowed from the bank are, subject to any charges on the appointed day on the undertakings transferred to the Council, and to the interest on the water stock, to be a first charge on all the property belonging to the Council, and on all water-rents and other income receivable by them. Nevertheless, it is to be the duty of the Council to pay all moneys borrowed in this way, and all interest thereon, out of the income from time to time accruing due to them.

The Council may, in addition to any other stock authorized by the Act to be issued, create and issue in such manner as they think expedient, any amount of water stock not exceeding £1,000,000, and may apply, for any purposes of their constitution to which capital is properly applicable, the moneys arising from the sale of such stock, or any part thereof. A trustee, executor, or other person empowered to invest money in public stocks or funds or other Government securities may, unless specially forbidden, invest the same in water stock. The stock is to be transferable and transmissible in the same manner as, and be generally subject to the like provisions, *mutatis mutandis*, as stock of the London County Council. It is provided that it shall not be necessary to redeem any water stock till the expiration of 90 years from its creation, or to commence any payments into any consolidated loans funds for the purposes of such redemption till the expiration of five years from the appointed day.

V.—*Directors, Officers, and Servants.*

Every Director of the Companies who is in office and has held office for not less than three years on the appointed day, is to be entitled to receive, by equal half-yearly payments out of the income of the Council, a life annuity equal to his yearly salary or fees on the average of such period of three years. All the existing officers of the Companies are to be transferred to, and become the officers of, the Council; but the Council may abolish any office they may deem unnecessary. Any officer required to perform duties which are not analogous, or are an unreasonable addition, to those he is discharging, may relinquish his office; and any officer so relinquishing his office, or whose office is abolished, is tobe entitled to compensation. Sub-sections 4 and 7 of section 81 of the Local Government Act, 1894, are to apply to the existing officers affected by the Act; and the Council may, if they think fit, take into account continuous service under any of the Companies in order to calculate the total period of any officer entitled to compensation under the Act. Subject to the provisions of the Act as to existing officers and servants, the Council may appoint such others as they may require, assign them their duties, and award them their salaries.

VI.—*Miscellaneous.*

The final division of the Bill contains clauses bearing upon the accounts of the Council and the audit thereof, the sale of superfluous lands and buildings, the promotion of Bills in Parliament, the dissolution of the Companies, &c. The accounts are to be made up to such day, be kept in such form, and be audited in such manner, as may be prescribed by the Local Government Board; and an abstract of them is to be sent to the Board and laid before both Houses of Parliament. The portion of the Metropolis Water Act, 1871, which relates to accounts (sections 37 to 42) is not to apply to the Council. The Council are to be at liberty to sell any buildings or land which they may not require for the purposes of the Act; and they are to apply the moneys arising from such sale in repayment of borrowed moneys or in expenditure properly chargeable to capital. They are to have power to introduce Bills authorizing them to raise further moneys, and generally to promote and oppose Bills in the interests of the inhabitants of the Metropolitan water area; also to institute or defend any action or other legal proceedings necessary or proper for the protection of those interests. In the definition clause, the word "undertaking" is

explained to mean, in the case of any of the Companies, "all such property real and personal, including cash balances, reserve funds, investments, and all other interests and rights in, to, and out of the property, real and personal, and obligations and things in action, as may be in the possession of the Company, or belonging to them immediately before the appointed day." It is provided, however, that, in the case of the New River Company, the undertaking of that Company is not to include any landed estate, houses, or property not directly used for or connected with their water supply. The "appointed day" means the 1st of January, 1903, or such other day as may, on the application of the London County Council, be fixed by the Local Government Board; and different days may be so fixed for different purposes and different provisions of the Act.

The first schedule to the Bill consists of the names of the eight Metropolitan Water Companies; the second deals with the meetings and proceedings of the Council; and the third consists of the rules laid down for auditing the accounts.

PORTSMOUTH CORPORATION AND THE WATER-WORKS.

Decision to Purchase.

At the Meeting of the Portsmouth Town Council last Tuesday, the proposal for the purchase of the undertaking of the Portsmouth Water Company, which had been before the Council at a meeting held on the 15th ult. (*ante*, p. 228), was again under consideration. It may be remembered that a Committee entrusted with the matter had presented a report thereon, which was withdrawn to allow time for further reflection, in view of the importance of the question at issue. The report was again presented. Purchase was proposed to be effected by the creation of Corporation stock sufficient to pay the dividends payable at the time of the undertaking being acquired. The Corporation to agree to pay all the costs, nine years' fees to Directors and Auditors, and create stock to pay off debentures. It is estimated that nearly £1,250,000 of stock will have to be created; and the annual charge required to meet this will be £42,000—the period for the repayment of the loan being 80 years. The Committee estimated that, though the income available would not apparently at first be sufficient to provide for the full sum required, including the redemption, as there was a balance on the revenue account of about £11,000, this would cover all deficiencies at the commencement.

Mr. H. R. PINK resumed the debate. He said the figures he submitted at the previous meeting were absolutely correct; and, taking everything into consideration, if the purchase was effected, there would really be no loss whatever. Of course, there were two great facts to be borne in mind. The figures he gave were based upon the town increasing at the same ratio in the next ten years as it had grown during the past decade. Then the figures had also been arranged upon the possible increase in the maintenance of £80,000, and an addition to the capital charge of not less than £10,000. So that the only question was as to whether the Council were prepared to risk the borough increasing in the same ratio as it had done, and therefore purchase, or whether they would throw up the whole matter once for all; for he honestly believed this would be the last opportunity the Council would have of acquiring the undertaking. The amount of capital raised since 1898, when the question of purchase was last before them, was £80,000. This had been obtained at 5 per cent., so that really the position of affairs was now exactly as it was in that year. At the previous meeting, certain questions were submitted to which the Committee were directed to obtain replies. This they had done. Having dealt in detail with objections which had been raised to the scheme, Mr. Pink said the question resolved itself into this: Had the Corporation sufficient confidence in the power of the borough to so increase that its revenue would practically increase at the rate of £2000 a year for seven years? If they had, and were willing to take the risk, then there would be no harm in the purchase. It was only fair to say that he had inquired of the Clerk to the School Board, who had told him that the number of places required for scholars was practically not one more than it was six years ago; thus showing that there had been no expansion in the growth of the town. It was also a fact that the increase in the population, as shown by the late census, had not been so large as was anticipated. In conclusion, he said a hint had been thrown out that the Company's works could be obtained at a much lower figure than had been contemplated, but this would be by spoliation; and he did not think the Council would agree to that. If a £10 share was worth £30, they ought to pay for it at that rate.

Mr. EVANS pleaded for careful and prolonged consideration of the matter. He contended that the only people who would make a good bargain by it were the shareholders of the Company, who were changing an uncertainty for a certainty. The only thing the Corporation would gain would be the control of the undertaking; and he did not think this was worth the price asked. The policy for the Council to follow was to ensure a hold over the Company in order to secure a good service.

Mr. STOBIE followed, and expressed the opinion that the Company, notwithstanding all that had been said to the contrary, would always be ready to sell. There was, therefore, no need for the Council to hurry themselves.

Mr. MURTOUGH spoke strongly in favour of the proposal.

Mr. FOSTER remarked that the great question was one of price. It had been well said that the shareholders of the Company were changing an uncertainty for a certainty. The speaker might have gone further, and said that while the shareholders had everything to gain and nothing to lose, the ratepayers had nothing to gain and everything to lose. The charges for water were not to be reduced, and the consumers could not have a better supply than they had at the present time. He declared that the ratepayers had no possible chance of gaining anything, and the Council, as representatives of the ratepayers, would have extra work cast upon them. Then the life of the mains

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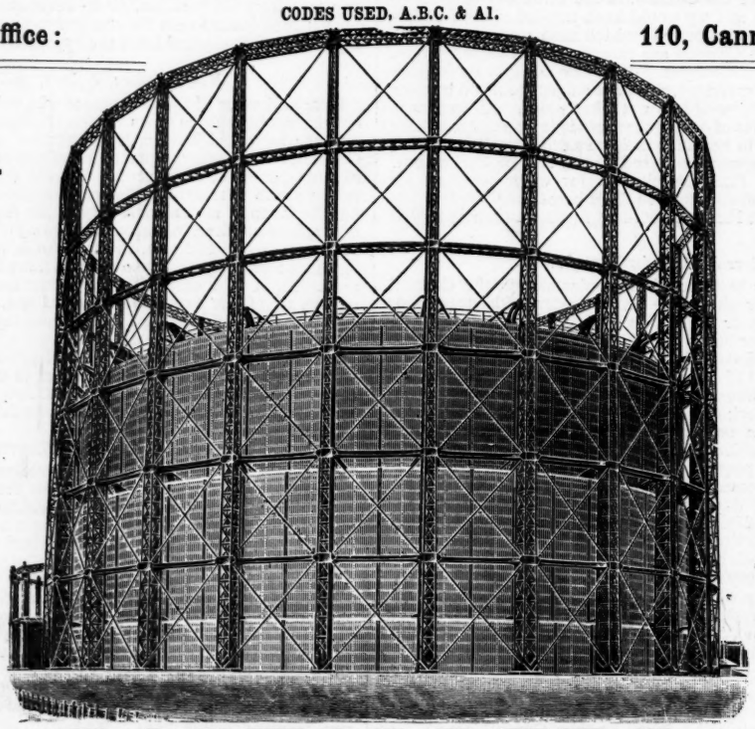

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was a serious point to be considered, for would they not be worn out long before the 80 years had expired? The life of the mains and reservoirs, which had already been in use for a number of years, seemed to him to be one of the fatal objections to the purchase of the water-works; and he pointed out that in case of purchase the Corporation had not a single penny coming to them under the scheme to meet emergencies and contingencies.

Sir W. PINK admitted that the Council proposed to give a large sum of money for the water undertaking; but it was to be paid for a splendid property. He supported the proposal to buy on the ground that water was a necessary of life. The cost of the works must inevitably rise, and it was therefore advisable to buy as quickly as possible. He was confident the Council had sufficient ability to carry on the work.

Mr. PALIN contended that the basis of the scheme was far too extravagant, and advocated a Bill being promoted to enable the purchase to be effected on different lines.

Mr. W. T. DITTMAN, referring to the suggestion that the water-works should be purchased by arbitration under an Act of Parliament, said that when the tramway question was in its infancy they had an opportunity of acquiring the tramways on the Directors' terms. There was not a man in the Council who did not now regret not having accepted those terms. Under these circumstances, they could throw to the wind all suggestion as to arbitration. Those members who could carry their minds back for twenty years would remember that the purchase of the water-works could then have been effected for a million sterling. But the same arguments were used then as now. They were told to look at the great risks. Had their predecessors taken the risks twenty years ago, they would have had the Company's undertaking, and been in the receipt of a large profit for the relief of the rates. He was quite sure they had sufficient ability in the Council to manage the undertaking.

Mr. PINK, in reply, said the assumption was that the Council were going to run this concern for a profit. His idea was that no water undertaking should be carried on for profit, but that the charges should be reduced from the profits. A main would have to be laid to the Dockyard, but the extra amount of water the Government used would cover the annual expenses.

The Council then divided on an amendment for postponing the consideration of the matter until after the Council had re-arranged the formation of the Committees; and the result was that the amendment was lost by 25 votes to 9. A vote was then taken on the motion for adopting the Committee's report, when the purchase scheme was adopted by 23 votes to 12.

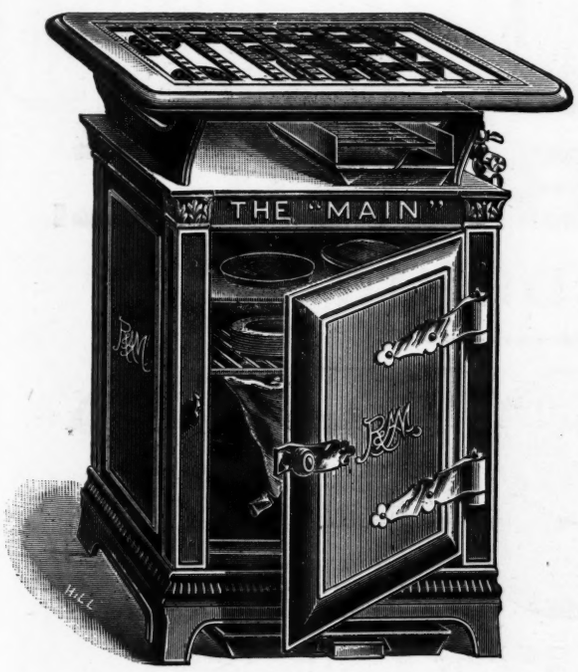
Blaydon and District Water Supply.—A Local Government Board inquiry was held at Blaydon last Tuesday regarding an application by the District Council for permission to borrow £3400 for works of water supply. Evidence was laid before the Inspector to show that the districts covered by the scheme were Winlaton, with a population of 3500; High Thornley, 100; Barlow, 500; and Spen, 1600.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The explosion at Tod's Mills, in Stockbridge, Edinburgh, to which I referred last week, formed the leading topic of conversation at the meeting of the Edinburgh and Leith Gas Commission on Monday. Mr. R. Menzies said he wished to learn whether, before the removal of the gas-engine was commenced, Mr. Herring, or his department, received notice from the engineers that it was to be removed, so that the gas at the main should be turned off; when notice that an explosion had taken place was given at the gas office; and also whether Mr. Herring had examined into the cause of the explosion, and if he had any report to make in the public interest. Bailie Waterston quite agreed with Mr. Menzies; but he doubted whether it was wise, until a judicial inquiry had been made, that the Engineer should give his opinion as to the explosion. Sir Andrew M'Donald, who presided, said the matter was wholly a gas question—the thing they were interested in. Mr. Herring replied that notice of the explosion was received by telephone message from the Central Police Office at 12.45 p.m. The necessary instructions were immediately despatched for the turning off of the gas at the valve beneath the pavement in the street. They did not receive any notice of the intention of the parties to remove the engine. He visited the scene of the accident, accompanied by the Convener of the Works Committee (Mr. Purves). On entering the engine-room, he examined the meter, and found that the inlet coupling on it had been disconnected. This, no doubt, permitted gas to escape, in consequence of the valve in the street not having been turned off. He thought it only right to remark that the pipe ought not to have been uncoupled by anybody except the Gas Commissioners' workmen; and, further, that, under the Gas-Works Clauses Acts, parties interfering with gas-meter connections rendered themselves liable to prosecution. Had they had intimation of the necessity of the coupling at the inlet of the meter being disconnected, they would, in the first place, have turned the gas off at the valve in the street, before interfering with any of the pipes within the building. If they had been informed that the gas-engine was to be removed, they would have sent a man to examine the place, and to see whether it was necessary to disconnect the coupling at the meter. As a matter of fact, it was not necessary, and if it had not been done, there would have been no explosion. The engine was supplied by a 3-inch pipe. He could not say if it had been laid specially to the engine. There might have been some lights taken off it; but the mill was lighted by electricity. The gas was turned off by the cock at the inlet to the meter; but the coupling beside the cock—between it and the street—was disconnected. Bailie Waterston thought it right to say that, when the message came to the City Chambers, he (the Magistrate present) made his way as quickly as possible to the place; and when he arrived he found the gas people on the spot, doing their utmost while the injured people were being removed. It was creditable to both the gas and the water people that he should be able to say nothing was



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lost through their action. Mr. Purves thought the public should be impressed with the fact that it was their bounden duty, if there was anything to be done about a gas-meter or the inlet-pipes to it, to communicate with the Gas Commissioners. Everyone had notice to the effect that no meter should be removed or disconnected except by the servants of the Commissioners. Even in the removal of a 4 or 6 light meter there was some danger; and it ought to be done by people who were daily accustomed to such work. The Chairman said he had no doubt the question and answer would do good, in warning people against doing as had been done here.

The best of all warnings is, of course, the death of five men as the result of this untoward incident. Comment must be very sparing as yet, because judicial proceedings are being taken; but I shall not be transgressing even the unwritten code of moral jurisprudence, if I state that the unfortunate man who undid the coupling did not put himself to the trouble to procure an appropriate tool wherewith to unscrew it, but cut the coupling by means of a hammer and chisel. Who gave him the order (if he received any) to undo the coupling, cannot be ascertained now; for he and all the others who were working upon the engine are dead. The work was done with a haste—and therefore rashness—which is unaccountable. Some are at a loss to understand how the men did not notice the smell of gas when it began to escape. In regard to this, Mr. Herring points out that there is always a smell of gas when old gas plant is opened up, and it would only take a minute or two for a 3-inch pipe, at full day pressure, to produce an explosive mixture.

In accordance with the provisions of the statute passed by Lord Advocate Balfour (now Lord Justice-General of Scotland), providing for the equivalent of coroners' inquests being held in Scotland, an inquiry took place before Sheriff Rutherfurd and a Jury in Edinburgh yesterday. It was the hope of the parties who promoted the Act of Parliament that at these inquiries information might be obtained which would enable liability to be fixed upon the person who might be responsible for the accident; but the gentlemen who hold the offices of Sheriff have done their best to prevent this, and have confined the inquiries into the facts which could be spoken to, and the verdicts into colourless conclusions which neither condemn nor exonerate anybody. In this instance, the evidence is interesting. The verdict is of no use to anyone; and the cost and trouble of the inquiry might have been saved. I presume that a coroner's jury would have added a clause to the effect that the escape of gas was due to the culpable conduct of one of the workmen in uncoupling the service-pipe from the meter, but that there was no evidence as to who did it, who directed it to be done, or for what purpose it was done.

The Commissioners adopted a recommendation by the Works Committee, arrived at after consideration of a report by Mr. Herring, to embark upon the manufacture of briquettes from coke dust at the Granton works. These works are now yielding a revenue, as the Committee have just sold 50 tons of sulphate of ammonia which was manufactured at them.

The Finance and Law Committee, having considered the abstract of the accounts of the Commission for the year ending May 15, found them to be correct, and recommended the Commissioners to allow and certify them, and to set apart for the annuities sinking fund and the mortgage sinking fund the minimum contributions, amounting to £10,402 11s. 6d., and carry forward to next year the balance of £6410. In the contributions to sinking funds there is included nothing in respect of the money expended on the Granton works; such contribution being suspended for this year, in terms of the Commissioners' Act of 1898. Bailie Manclark, of Leith, the Convener of the Committee, in moving the adoption of the recommendation, pointed out that the revenue during the year showed an increase of £24,319. The larger part of this increase was, of course, due to their having raised the price of gas by 4d. per 1000 cubic feet in October-November last. The increased price, on the whole year, only amoun ɪd to 2¾d. per 1000 cubic feet. They would not have a full twelve nonths of the increased price till October next. Therefore, he thought, the position they were in was very satisfactory. The recommendation was adopted, the accounts were signed by the Treasurer (Mr. J. S. Gibb), and the Auditor (Mr. H. Kenward Shiells) was re-elected. Thus did the Commissioners part with a year which, of necessity, would have been a critical one in their existence, which was rendered more so by the rise in the price of coal, and which they have credit in engineering themselves through in the way they did.

Mr. W. M'Crae, Engineer and Manager of the Dundee Gas-Works, has reported to the Gas Committee that the Contractor for the north half of the new retort-house and coal-store was 27 weeks beyond the contract time; that the Contractor for the south half was 41 weeks late with his contract; and that the Contractor for the new chimneys was 29 weeks late with the first one, which was completed on May 30 last. The penalty in each case is at the rate of £20 per week. The Committee resolved that in one instance a claim should be made, and instructed the Clerk to put it in force. The Contractor selected was Mr. W. Anderson, who erected the chimneys. The recommendation of the Committee came up at a meeting of the Town Council on Thursday. Mr. Quirk thought they should hear the Contractor's defence before fining him £20 a week. Mr. High said they had spent £100,000 upon the gas-works, and were getting nothing for it. Owing to his delay, Mr. Anderson had made himself liable in penalties aggregating to £1940. What was the use of their entering into contracts, unless they were to be rigidly carried out? They were losing £150 a week upon the carbonizing of the coal in the gas-works, in consequence of the contracts not having been fulfilled. Treasurer Ritchie moved that the recommendation be agreed to. He said the Contractor's defence would be learned when the claim was made upon him; and that they had not expended half the sum mentioned by Mr. High. The recommendation was adopted by 23 votes to 5. This looks like the beginning of a long and costly litigation, which is quite in keeping with the traditions of Dundee municipal life. Their method of acquiring the gas undertakings was a most expensive one; and they had a protracted litigation over the construction of the Lintrathen water-works.

The accounts of the Greenock Corporation Gas Department for the past year have been issued. They are not good reading. There is a

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deficit on the twelve months' working of £2311. At this time last year, a deficit of £2606 was reported; and it was then resolved to raise the price of gas from 2s. 11d. to 3s. 4d. per 1000 cubic feet. The extra 5d. did not suffice for the working of the undertaking, but left a large balance on the wrong side. The debit balance is now nearly £5000. The accounts were submitted to the Gas Committee on Tuesday, and were retained by the Committee for further consideration before being reported to the Town Council. Last year there was the same trouble over the accounts; and it was not till the third week of September that they were adopted. It was then stated that the debit balance began in 1899, when it amounted to £456; and that the cause of the big deficit a year ago was the shortness of retort power in the works, in consequence of which it was necessary to buy dear cannel, to enable the gas supply to be kept up. Mr. W. Ewing was appointed Manager of the works in October, taking up his duties in November. By that time the coal contracts had been let, and the estimates fixed. He cannot, therefore, be held accountable for the deficit which has again arisen.

Among the gas managers to whom credit must be given for foresight is Mr. Robert Muir, of the Galston Gas Company. Large extensions to his works have just been completed, after his own plans and largely by his own workmen. The retort-house has been extended till it is now four times the size it was; and ample coal storage has been provided under the same roof. The plant has been brought up to date by the addition of a combined engine and exhauster and a Holmes patent scrubber. The new plant was started, at a little ceremony about a month ago, by Mr. John Hendrie, the Chairman of the Company, who, in the course of a short address, said that within the last four years the Company had doubled their coal bill, while their revenue from gas had only increased by one-fourth. This showed that the profitable working of such concerns was much more difficult than it used to be. Mr. Hendrie paid a warm tribute to Mr. Muir's abilities as a Manager; and afterwards, when refreshments were served to the company, Mr. Muir's health was cordially pledged.

The annual meeting of the Airdrie and Coatbridge Water Company was held on Tuesday last. It was reported that on Jan. 9 notice was received from the Airdrie, Coatbridge, and District Water Trust, which was created by statute in 1900, of their intention to purchase the Company's undertaking, and offering £315,000 as the price—this sum being based on 28 years' purchase of the ordinary and 30 years' purchase of the preference shares. The Directors of the Company had since been advised to ask £460,000. The Water Trust have intimated that they were not inclined to pay this sum; and preparations are being made for arbitration. The usual dividends were declared.

According to the tabulated statistics given by "The Times" of the capital created during the first half of the present year, it appears that the total, exclusive of the extraordinary issue of £60,000,000 in Consols, was £37,781,412, against £44,156,075 in 1900, or £6,374,663 less. Of course, the figures for last year do not include the War Loan.

CURRENT SALES OF GAS PRODUCTS.

LONDON, *Aug.* 3.

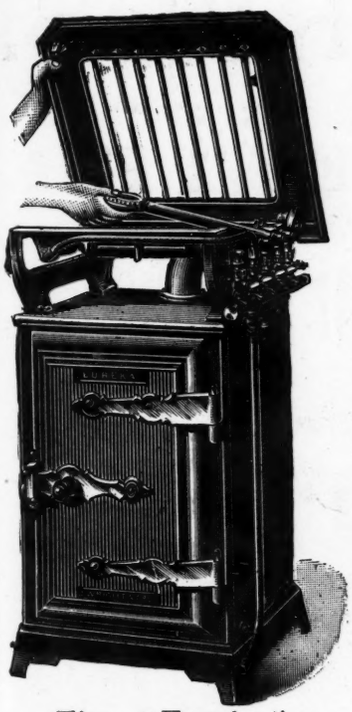
Tar Products.—There is little or no business to report; matters being generally dull owing to the approaching holidays. In 90 per cent. benzol, business is reported at 9¼d. for shipment at out-ports during August; but an offer of 11d. for all next year was declined by one of the largest London refiners. 50-90 per cent. remains without interest. There are sellers at 9d. at out-ports in the North of England; but consumers do not appear at all anxious to purchase. Solvent continues very dull, especially in the North, where sales are reported at very low prices. In anthracene there is really nothing to report. It is not likely that any improvement will take place this year, as consumers decline to consider offers. In crude carbolic, the depression continues, and crystals are still being offered by dealers at 7½d. for August-December. Makers, however, do not quote less than 8d. in any position. Business has been done in 60's crude at 2s. 1d. prompt shipment. But the Continental demand has decidedly fallen off; and for forward delivery lower prices will have to be accepted. Pitch continues firm; and the demand from South Wales is good, especially for prompt delivery. Tar oils are decidedly quiet in both the North and Midlands, though values are still maintained in London. The competition for tar continues rather strong; and the prices lately paid will certainly turn out unfavourably for the distillers unless the value of products improves all round.

The average values obtaining during the week are: Tar, 14s. 6d. to 18s. Pitch, east coast, 30s. 6d. to 31s.; west coast, 28s. to 28s. 6d. Benzols, 90's, 9¼d. to 9½d.; 50's, 9d. Toluol, 10½d. Crude naphtha, 4¼d. Solvent naphtha, 1s. Heavy naphtha, 10d. to 11d. Creosote, 1⅛d. to 1⅛d. Heavy oils, 2⅛d. Carbolic acid, 60's, 2s. 1d. Naphthalene, 60s. to 70s.; salts, 30s. to 40s. Anthracene, "A," 2¼d. to 2½d.; "B," nominal.

Sulphate of Ammonia.—The market is certainly firm, with an upward tendency. The Gaslight and Coke Company have evidently made considerable sales at £10 15s.; and in all probability their price will be £10 17s. 6d. next week. As regards Leith, there are now sellers at £10 12s. 6d. for prompt; but makers decline to quote forward, believing in higher prices. As regards Hull, a little business has been done at £10 10s. for prompt shipment. As to Liverpool, there is a very good demand for shipment towards the end of August; but makers are not anxious to offer for this period, generally believing in higher prices.

COAL TRADE REPORTS.

Lancashire Coal Trade.—As collieries have now got into the month of August without any further official reduction in the list basis rates, it may be fairly assumed that prices generally have touched the minimum, for the present year, at least. In house-fire qualities, coalowners



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Telegrams: "EUREKA" B'HAM.

have been placed in a somewhat trying position, owing to a very considerable quantity of surplus output being pushed for sale at temporarily low-cut prices. But as no heavy stocks are held, they have for the most part evidently decided that, with the season now so far advanced, any official reduction in prices would scarcely appreciably improve their position, so far as any increased sales just now are concerned. For the present, there is very little buying going on beyond absolute requirements, which are extremely small; and merchants and dealers are picking up cheap spot lots to carry them on. The full list rates are therefore scarcely more than nominal; but they remain on the basis of 15s. per ton at the pit for best Wigan Arley, 13s. to 13s. 6d. for Pemberton four-feet and seconds Arley, and 11s. to 11s. 6d. for common house coal. With regard to the lower qualities of round coal, prices may also be taken as practically settled. The gas coal contracts, with a few unimportant exceptions, have now been completed; and the Associated Lancashire Collieries have generally held loyally to the understood maximum reduction of 2s. 6d. per ton on last year's rates for screened gas coals (although, outside the Association, prices have in some instances given way quite 3s. 6d. per ton), while on unscreened gas coals the authorized reduction has been 3s. 6d. per ton. Apart from Lancashire collieries outside the Association, Derbyshire has been a keen competitor for some of the gas coal contracts, and has got into districts that have hitherto been supplied from other quarters. The basis for Lancashire gas coals has been very much as reported previously in these columns. Unscreened gas coals have averaged about 10s. per ton; and screened gas coals have been obtained in exceptional cases at from 10s. 3d. to 10s. 6d. per ton for medium, with the better qualities ranging from 10s. 9d. to 11s. 3d. The locomotive fuel contracts have also brought forward a keen competition from Derbyshire, at prices which Lancashire and Yorkshire collieries were not prepared to entertain; and the result has been that, while considerably less quantities of locomotive fuel have been placed in Lancashire, Derbyshire coalowners have secured fairly large contracts with all the principal railway companies, at prices ranging from 8s. 3d. up to 8s. 9d. per ton at the pit—the basis for Lancashire and Yorkshire being a minimum of 9s. Steam and forge coals have also been governed to a large extent by the prices at which railway companies have been able to buy; and contracts with works have averaged about 9s. to 9s. 6d. per ton at the pit. There has, however, been the greatest cutting in prices in clearance sales for shipment; collieries evidently preferring to send away quantities to the ports at low prices, rather than quote further reductions on inland sales. Steam and forge coals have been readily obtainable at 10s. to 10s. 3d. per ton, delivered at the ports on the Mersey. A feature of the market has been the steadying during the past month in engine fuel. This has been due chiefly to the lessened demand for screened coals, both for inland consumption and for shipment. Lancashire collieries have not been producing any excessive quantity of slack, beyond the requirements of their customers; and in Yorkshire and Staffordshire also the surplus of slack has been much less than is usual at this time of the year. The only district where slack has been accumulating in large quantities is Derbyshire; and here the stringent railway regulations as to siding rents and wharfage charges have put a check upon the sending of large quantities into Lancashire which merchants would be compelled to hold for any length of time. The result has been that prices have hardened, and there has been no difficulty in getting 8s. to 8s. 6d. per ton for best Lancashire slack, with commoner sorts quoted 6s. to 7s. Whether these prices will be maintained, is perhaps open to question, as, with the close of the present month, there will naturally be an increased demand coming on the market for house coals, and there will also be larger deliveries of gas coal. Both these mean a correspondingly enlarged production of slack; while the unsatisfactory outlook in the staple manufacturing industries of Lancashire points to a restricted consumption of slack. Coke is in good demand, with prices firm, and tending to harden.

Northern Coal Trade.—There is increased activity in some of the branches of trade, due largely to the desire to execute contracts as fully as possible during the time that the rebate is allowed from the coal tax. In best Northumbrian steam coals, the demand is full; and as some of the chief collieries have sold the bulk of their output for the month of August, prices are firmer—13s. 6d. per ton being the f.o.b. quotation. Second-class steam coals are 12s. 6d. to 12s. 9d., and steam smalls are from 5s. to 5s. 6d. In regard to gas coals, there is a strong demand for export; and there is an increase also in the quantities that are being sent to the South of England, which are usually enlarged about this time of the year. The demand for export takes up a considerable part of the production; and thus higher prices are quoted for occasional cargoes beyond these contracts. For very best Durham gas coals, from 10s. 6d. to 11s. per ton is quoted in such cases, which is 1s. 6d. to 2s. per ton above the prices at which the large contracts are now generally running. In coke the demand is good; and best Durham coke for export is quoted at from 17s. 6d. to 18s. per ton f.o.b. Blast-furnace coke is 15s. to 15s. 6d. Gas coke is now at about 12s. per ton; but exports seem to be rather limited at present.

Scotch Coal Trade.—Trade is of small dimensions at home, with prices unaltered. This is the height of the season for export; and the figures are up. The time for which the miners' wages were "conciliated" expired with July; and the masters propose a reduction, which may lead to trouble. It is felt that the fall in the price of coal has been more, proportionally, than the reduction of wages. On the part of the men, it is said that the wages were too low before they began to be raised. The probability is that there will be no further fall in the price of coal till this question is settled—if there be then. The prices quoted are: Main 9s. to 9s. 3d. per ton f.o.b. Glasgow, ell 10s. 3d. to 11s. 3d., and splint, 10s. 3d. to 10s. 6d. The shipments for the week amounted to 152,973 tons—an increase of 28,051 tons upon the previous week, but a decrease of 12,754 tons upon the corresponding week of last year. For the year to date, the total shipments have been 5,346,092 tons—a decrease of 634,514 tons upon the same period of last year.

The Economical Gas Apparatus Construction Company, Limited, have received an order for carburetted water-gas plant, for 500,000 cubic feet daily, for the Smethwick Corporation Gas-Works.

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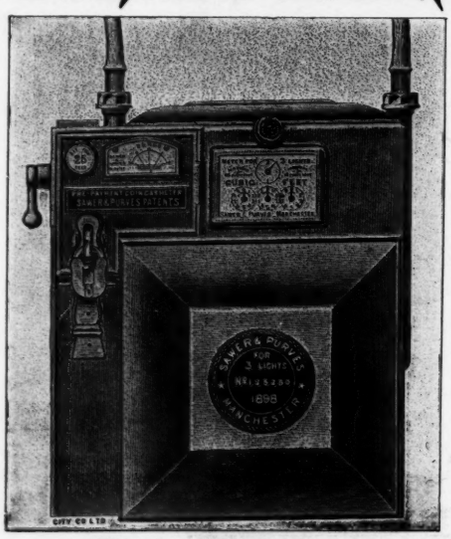
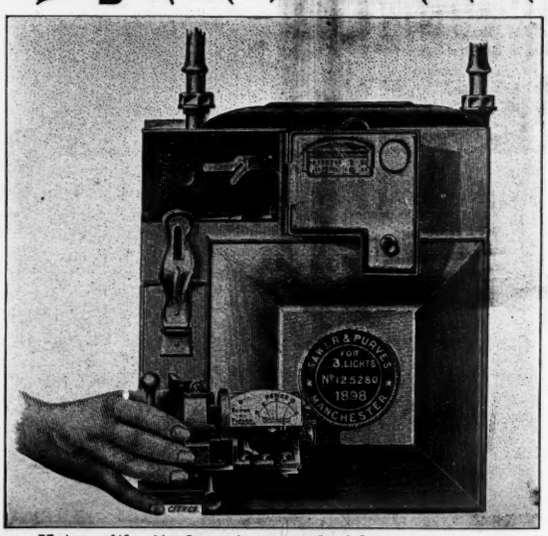


Meter in working position.



Meter with attachment removed without uncoupling.

Southport's Trading Undertakings.—The yearly abstract of accounts of the Southport Corporation which have just been issued by the Borough Treasurer (Mr. P. J. Whitehead) include some statements which are disappointing to the ratepayers, seeing that certain of the departments show results considerably below the estimates. For example, the high price of coal has had the effect of reducing the profits on both gas and electricity. The profits on the gas estate were £5583, as compared with £10,323 in the previous year; and as £8000 had been anticipated for the relief of the rates out of the concern, there was, after taking credit for £1323 brought forward, a deficiency of £1092. The wider use of electricity has, it is stated, been a factor in decreasing the consumption of gas for lighting. At the same time, the profit in the Electricity Department is only £695, as against £1779 in the previous year—the estimated profit being £1500. The deficiency in this respect is therefore £804.

New Capital for the Shrewsbury Gas Company.—The Shrewsbury Gas Company are taking immediate advantage of the powers they have just secured in the Act of this session. At a meeting of shareholders, a resolution has been passed to the effect that, in conformity with clause 5 of the Act of 1901, the sum of £98,235 of gas stock be created and issued, and divided among holders of existing stock. The Directors, on the same occasion, were authorized to obtain £10,666 upon mortgage in respect of the converted stock now created and issued in accordance with the Act. Further, they were empowered to create £20,000 of additional ordinary stock, and to issue and offer from time to time by auction or tender such single lots of stock of £100 nominal value as shall be sufficient to produce an amount not exceeding in the whole the £20,000, including the premiums obtained upon the sale. Following upon this, they were authorized to obtain £6666 upon mortgage, when the £20,000 of additional stock has been issued and all of it was fully paid up.

Gas Explosion at Garforth.—An explosion of gas took place a few days since at one of the houses in Gascoigne Terrace, Garforth, occupied by a miner named Charles Parker. Mrs. Parker was standing at a table facing the fire-place, and a married daughter was sitting on the sofa with a baby, when, without the slightest warning, there was a violent upheaval. There was no sharp report—at least those chiefly concerned heard none—but the heavy stone flags of the kitchen floor were tossed up, the baby disappeared from the mother's knee, and she herself was thrown down, while her mother and a younger sister were also thrown into the shallow pit which was exposed by the eruption of the kitchen floor. Help quickly arrived, and Mrs. Parker and her daughter were extricated. The baby was found in a corner of the apartment uninjured. Medical aid was summoned, and the two chief sufferers were conveyed to the Leeds Infirmary. The curious feature of the occurrence was that there was no gas-pipe in the house, and it was ascertained that the accident had occurred through a leakage from a pipe outside. From this pipe, about a yard from the dwelling, gas had accumulated under the flooring, and it was ignited shortly after the lighting of the copper in preparation for the day's washing.

The Cray Water-Works of Swansea.—Following on the recommendations of Mr. G. H. Hill, the Swansea Town Council have passed a comprehensive resolution agreeing to complete the construction of the Cray water-works by direct administration; appointing a Works Committee with power to do all acts and things necessary and expedient for the performance of the work; authorizing the appointment of a Manager by the Water and Sewers Committee; and sanctioning the continuance of the works, until such appointment, under the Engineer (Mr. Wyril) and the Resident Engineer (Mr. Kitchingman.)

The Loughborough Gas-Works in Jeopardy.—Last Tuesday afternoon, the Loughborough Theatre—a corrugated iron structure, lined with wood—was burnt to the ground. The accident calls for notice in these columns from the fact that the conflagration placed in jeopardy the largest holder at the gas-works, which stands on the border dividing them from the theatre property. The Fire Brigade found there was no chance of saving the burning building, so they directed their attention to the adjacent structures. The steam-engine was taken to a point near the holder, and, under the directions of the Manager (Mr. E. Onions), the men worked with a will while the necessity existed. The heat was so great for a time that as the water fell upon the sides of the holder it was converted into steam. The efforts of the brigade fortunately resulted in localizing the fire.

Wolverhampton Water Accounts.—The report of the Wolverhampton Corporation Water Committee shows a profit, after paying interest on the capital, and providing for the annual instalment to the loans fund sinking fund in respect of that portion of the water debt represented by Wolverhampton Corporation 3½ per cent. stock, amounting to £5632. Of this £3000 is to be transferred to the credit of the improvement fund, and the balance of £2632 carried forward to the reserve fund. It is mentioned that £2016 was expended during the year out of the reserve fund on account of the renewal of boilers at the Tettenhall pumping-station. The gross profit amounted to £16,904, out of which £11,272 has been paid for interest and in reduction of sinking fund. The daily average consumption of water during the year was 3,060,791 gallons; and the domestic consumption per head 18·03 gallons. At the meeting of the Corporation last Thursday, Alderman Marston moved the adoption of the annual report, and the recommendation that £3000 be transferred to the improvement fund and £2632 to the reserve fund. An objection to the transference of £3000 was raised by Alderman Williams, who said the Council had no right to take money from the water consumers in order to sweep the streets and remove nightsoil pans. Those who had made the profit should receive the benefit of it by having cheaper water, which would enable them to provide water-closets. In Birmingham they saw a different state of things altogether, for Birmingham encouraged cleanliness by this means. If they could do it in Birmingham, they ought to be able to do it in Wolverhampton. Alderman Marston promised that the matter should receive the careful attention of the Committee, but pointed out that the price of water at Wolverhampton would compare favourably with Birmingham and other large towns. The motion was passed.

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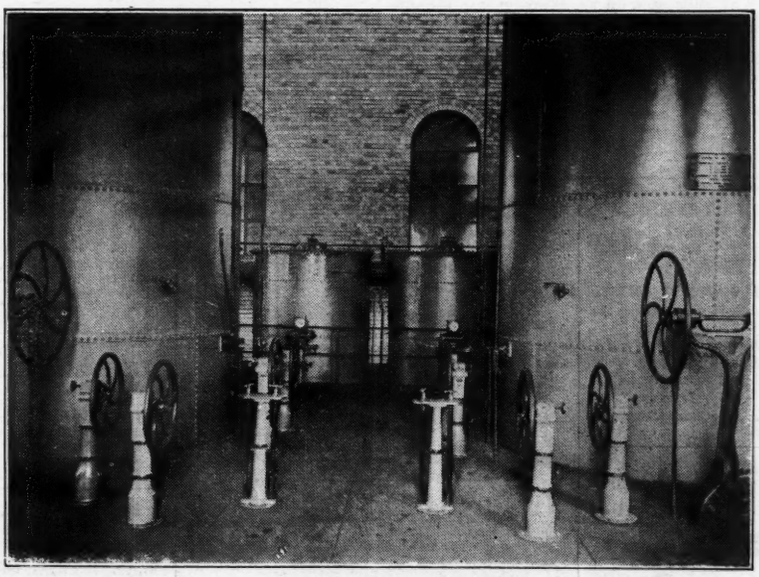

RESULTS PROVE EFFICIENCY.

Working Floor of Generator House. One Quarter Section of Birmingham Plant, Windsor Street Station.
The Maximum Daily Capacity of the Birmingham Corporation's Plant, which was erected by this Company is 10 MILLION CUBIC FEET.

Suffocated by Coal Gas.—A Battersea comb maker, aged 75, has met his death in a singular way. As no answer could be obtained to repeated knocks at his bedroom door, the police were called in, and the room was found to be full of gas. It seemed that he had been in the habit of using a portable gas-burner, which was supplied by means of a piece of flexible tubing attached to another burner in the centre of the room. Having got into bed, the deceased had pulled the burner towards him, and in turning the tap had disconnected the tube; thus causing the escape of gas.

The Loughborough Corporation and the Gas Company.—The dispute between the Loughborough Corporation and the Gas Company, to which reference has already been made in the "JOURNAL," has been settled. At the last meeting of the Town Council, it was stated that the Company had accepted £336, which, together with £1664 paid into Court, they had taken in full discharge of all claims against the Corporation, including the costs and expenses of the Company of, and incidental to, the winding up of the concern, and the costs of the proceedings which had been instituted, and which are now to be stayed.

Manchester Water Supply.—The Water Committee of the Manchester Corporation state that the flow of water into the Longdendale reservoirs is not such as seems likely to warrant any relaxation for a while of the restrictions at present being exercised with regard to its use. When the nightly turning off of the water was commenced on the 21st ult., the stock was equal to 47 days' supply. Last Wednesday, it was equal to a 53 days' supply; so that there had been only a gain of six days within that period. On the previous Monday, 25 million gallons found their way into the reservoirs. On Tuesday the inflow was reduced to 13 millions. The consumption on that day was about 30 million gallons. At Thirlmere, owing to absence of rain, the lake is going down at the rate of about an inch every 24 hours; but this has no bearing on the supply to the city, seeing that there is still a depth of 16 feet to draw from, and that only 8 million gallons can be brought thence daily.

York United Gas Company.—The half-yearly meeting of this Company was held last Thursday. Mr. J. R. Hill presided, and said it might be regarded as a singular circumstance that, although the profit of the half year fell short of the amount required by above £4000, the Directors should recommend the maximum dividends upon the three classes of shares. But the deficiency was anticipated owing to the rise in the price of coal; and the Company had fallen back upon the accumulation of unappropriated profits. At the last meeting, a resolution was passed to raise £30,000 more capital to meet the cost of a new tank and holder which were being built; but the Directors considered that the time had hardly arrived for favourably placing the new capital upon the market. The report was adopted. A special meeting was then held for the purpose of consolidating the capital; and a resolution was carried converting the 10 per cent., the 5 per cent., and the 4 per cent. shares into one uniform 4 per cent. consolidated stock.

New Reservoir for Margam.—The new reservoir of the Margam District Council, which is situate in the Cwmwerndi Valley, some three miles away from Port Talbot, is now practically completed. The cost of the undertaking will not be far short of £20,000. Storage capacity is available for 55 million gallons of the purest water in South Wales. The watershed comprises an area in round figures of 700 acres. The population served by the new works is at present about 10,000. The Aberavon Corporation are now being served with the water for the supply of the lower portions of the borough, and are using an average quantity of 90,000 gallons per day. The site of the reservoir is an admirable one some 500 feet above sea level, and secure from any mining operations which might affect the supply. Two strong streams flow into the reservoir, which is almost triangular in shape. A huge dam has been constructed across the valley, which has been the chief engineering work, as the reservoir itself lies in a natural basin.

Birmingham Water Supply.—At a meeting of the Water Committee of the Birmingham City Council, held last Thursday, under the presidency of Alderman Lawley Parker, it was stated that the consumption of water during the month of July was, on an average, 20½ million gallons per day; being half-a-million gallons a day in excess of the quantity used a year ago. The maximum amount consumed on any one day was on July 20, when 24¼ million gallons of water were consumed, compared with a maximum of 23½ millions distributed on one day in 1900. The storage in the reservoirs is less than it was at the corresponding period of last year; the diminution representing practically two days' supply. Mr. Anthony Lees, the Secretary of the Water Department, presented a report relative to the supply last month, which showed that some difficulty was experienced just before the break-up of the drought. Very useful help has been received this summer from the East Worcestershire Water Company, who are letting the city have the surplus water they obtain from their new well at Catshill, near Bromsgrove. It is interesting to learn from Mr. Lees that the returns this year indicate a greater consideration on the part of the water-using public than in previous summer seasons. Consumers appear to have a far higher appreciation of the difficulties of the department; and the usual summer appeal is stated to have been met in a most commendable spirit.

Water Scheme for Horwich.—The District Council of Horwich submitted to Mr. W. Meade-King, a Local Government Board Inspector, last Wednesday week, a scheme for supplying the town with water. The Council proposed (1) to lease 95 acres of gathering-ground at Wildersmoor from Colonel R. H. Ainsworth, at a rental of £400 per annum; (2) to secure the water rights over 34 acres on the Marklands and Stoneycroft Estates from Messrs. Mason, at a rental of £105; and (3) to construct a reservoir on the Marklands Estate, for which £12 10s. per acre was to be paid annually. The Council asked for a loan of £20,000 for the construction of the reservoir and other works. Copies of analyses by Mr. Campbell Brown, of Liverpool, stated that the water proposed to be taken was good for domestic use. Mr. Pierce, Deputy Town Clerk of Liverpool, opposed on behalf of the Corporation, who, he said, were ratepayers, and had large interests in the adjoining township of Rivington as owners of the water-works. He contended that the scheme had been designed without a proper knowledge of the facts, and by an engineer who had not constructed such works before; while the analyses of the water had not been proved. The District Council did not approach the Corporation to see whether or not they could let them have a supply. Mr. J. Parry, the Water Engineer to the Liverpool Corporation, showed the inspector their watershed, and pointed out that a cutting Colonel Ainsworth had made interfered with the quantity of water they had to send by way of compensation into the River Douglas. Mr. Cannon, for the Council, said he had never heard a more despicable attempt than that made by the Corporation, who came before them with a purpose which, if successful, would deprive Horwich of one of the necessaries of life, and did it on the plea that they were ratepayers. They paid £9 18s. 8d. annually; and on this ground they obtained a hearing that day without giving the slightest notice of opposition. The inquiry then concluded.

Messrs. Hanna, Donald, and Wilson, of Paisley, have obtained the contract for the erection of a holder at the Lockerbie Gas-Works. It is part of an extension scheme to be carried out.

We are asked by Messrs. Carless, Capel, and Leonard, of Hackney Wick, to state that their works were not at all affected by the deplorable accident reported in the "JOURNAL" last week (p. 302), and that their business is being carried on as usual.

The Directors of the Gas, Water, and General Investment Trust, Limited, have declared interim dividends at the rate of 4½ per cent. per annum on the preferred stock, and 2 per cent. per annum on the deferred stock, for the half year ended July 28.

The Stratford Fire Brigade of the Richmond Gas Stove and Meter Company, Limited, has again been beneficial to the Company's neighbours. Last Tuesday there was an outbreak of fire in the varnish-works of Messrs. Jenson and Nicholson; and the brigade promptly extinguished it. The fire on the previous occasion, it may be remembered, took place at the works of Conrad Schmidt.

We learn that the Sunderland Gas Company have recently placed a large contract with West's Gas Improvement Company, Limited, for a complete installation of West's compressed air stoking machinery for the Hendon Gas-Works. The same firm have in hand a contract for coal and coke handling machinery in connection with the inclined retorts for the Bristol Gas Company; also large coke-handling plant for the Southport Corporation.

The Omagh Gas Company have placed the development of their business in gas-stoves, &c., in the hands of the Richmond Gas Stove and Meter Company, Limited; not only for the supply of the stoves, but also for fitting them up. An exhibition to inaugurate the movement has just been held, and it was very successful. The Directors of the Gas Company showed their appreciation of the ability displayed by Miss Rogers in the cookery demonstrations by presenting her with a handsome gold bracelet.

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Gas-Works, Perth,
July 31, 1901.

THE Leeds Fire-Clay Company, Limited, require for their Gas Engineering Department a competent Gas Engineer as OUTSIDE REPRESENTATIVE.
Applicants must be competent Draughtsmen and have thorough knowledge of Gas-Works Appliances and Plant, and have had experience in the erection of Inclined Retorts, Conveyors, and Gas Apparatus generally. Liberal Salary to suitable Man.
Apply, in writing, giving full Particulars of past Experience, Age, Salary, and References, to the above COMPANY, 20, Park Row, LEEDS, marked "Gas Engineer."

WANTED, a Foreman for Show-Room and FITTERS (Gas and Water).
Applications, with full Particulars, to Mr. F. G. DEXTER, Water and Gas Company, WINCHESTER.

REPRESENTATIVE wanted immediately, to push the Sale of Fullford Regenerative Gas-Lamps, and to introduce general Gas-Fitting work. Liberal terms to a capable man who can influence good business.
Apply, by letter only, to the SECRETARY, Lamp Manufacturing Company, 10-14, Leonard Street, City Road, LONDON, E.C.

TRAVELLER—GAS-STOVE TRADE.

AN old-established Firm, anxious to increase business, require a specially CAPABLE MAN.
Applications will not receive attention unless from a Traveller or Representative of considerable standing, experience, and actual influence with Gas Companies.
Address No. 3724, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS MANUFACTURE EXAMINATIONS.

CORRESPONDENCE CLASSES. Young Gentlemen coached in Modern Gas Making and prepared for the City and Guilds Examination (Ordinary or Honours Grade), by an experienced Teacher. Successes: Five Seasons, Four Medals; last Season's Classes, 100 per cent. passed, nearly 60 per cent. first-class. Confidential.
For Terms, Particulars, &c., apply, by letter, to No. 3728, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a second-hand Gasholder, with Steel Tank. Capacity about 70,000 cubic feet. State Condition, how long worked, Measurements, general Construction, and Price.
Address GASHOLDER, care of Burbidge, Wilcox, & Co., 62, MOORGATE STREET, E.C.

TEN and Seven per cent. Torquay Gas SHARES FOR SALE.
Address No. 3730, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FOR SALE, Cheap—Two Purifiers, 8 ft. square by 4 ft. deep, in good condition, with Valves, Connections, and Lifting Gear.
INQUIRIES for all kinds of SECOND-HAND GAS PLANT will also be esteemed by SAML. WHILE AND SON, 60, Queen Victoria Street, LONDON, E.C.

FOR IMMEDIATE SALE—40 Lamp COLUMNS, Wrought-Iron Scrolls, and 14-inch COPPER LANTERNS. One large LAMP COLUMN, with 300-Candle Power ARC LAMP; Two 100-Candle Power ARC LAMPS and BRACKETS; 20 LAMP BRACKETS (various), with 14-inch Copper Lanterns.
Apply to H. WIMHURST, Gas-Works, SLEAFORD.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
J. F. BLAKELEY Gas Engineer, Thornhill, DEWSBURY.

TO BE SOLD—
GASHOLDER (with Wrought-Iron Tank), 30 ft. by 12 ft. Cable Guided. New in 1895.
CENTRE-VALVE, 15 in. diameter, by Walker, for Four Purifiers.
Four PURIFIERS, 10 feet square, in line, with Planed Joints, Walker Centre-Valve, Covers, and Traversing Crab Lifting Gear. Will be refixed equal to new.
Write J. WRIGHT, Bridge House, BLACKFRIARS, E.C.

FENNY STRATFORD GASLIGHT AND COKE COMPANY, LIMITED.

FOR SALE—Two 6 ft. and one 4 ft. 6 in. length of HYDRAULIC MAIN U shape. Size 13 in. by 11 in. Eight OVAL and Six ROUND MOUTHPIECES; Doors and Cramps complete. Also Eight lengths of 4-inch ASCENSION-PIPES. Second-hand, but in good condition.
Apply to the Secretary, THOMAS BEST, Fenny Stratford, BLETCHLEY.

FOR SALE—PURIFIERS, &c.

THE Altrincham Gas Company have for DISPOSAL the SIDE PLATES and COVERS of Six Water-Luted PURIFIERS, 20 ft. square by 5 ft. deep; also about 40 ROLLED IRON BEAMS, 12 in. by 5 in. by about 17 ft. long, weighing 43 lbs. per foot run. All in capital condition.
For further Particulars, apply to
J. E. LAMB,
Manager.
Gas-Works, Altrincham,

TO COAL OWNERS AND OTHERS.

THE Wokingham District Water Company invite TENDERS for 200 Tons of best WELSH SMOKELESS STEAM COAL, delivered at Wokingham Station.
Tenders to be sent in not later than Aug. 14, addressed to the Chairman, Water-Works Office, Wokingham.
The Directors do not bind themselves to accept the lowest or any Tender.
A. M. QUILL,
Secretary.

BOROUGH OF TORQUAY.

THE Gas-Works Committee of the Torquay Town Council are prepared to receive TENDERS for the supply of 1200 Tons of approved GAS COALS, delivered free into Stores at the St. Mary Church Gas-Works.
Further Particulars and Form on which Tenders must be submitted may be obtained at my Office, Town Hall, Torquay.
Sealed Tenders, endorsed "Tender for Gas Coals," to be sent to the undersigned not later than 9.30 a.m., on Tuesday, Aug. 13, 1901, addressed Gas-Works Barton Road, St. Mary Church.
The lowest or any Tender will not necessarily be accepted.
FREDK. S. HEX,
Town Clerk.
Aug. 2, 1901.

TO OXIDE OF IRON MERCHANTS.

THE Corporation of Birkenhead are prepared to receive TENDERS for the supply of 200 Tons of OXIDE OF IRON for Gas Purification Purposes.
Forms of Tender and other Information may be obtained from Mr. T. O. Paterson, Gas Engineer, Gas-Works, Thomas Street.
Tenders, sealed and endorsed "Tender for Oxide of Iron," to be sent to me not later than Five p.m. on Thursday, the 15th of August, 1901.
Deliveries to be made within one month of written instructions from the Gas Engineer.
The Corporation do not bind themselves to accept the lowest or any Tender.
By order,
ALFRED GILL,
Town Clerk.
Town Hall, Birkenhead,
Aug. 3, 1901.

URBAN DISTRICT COUNCIL OF OLDBURY.
(GAS DEPARTMENT.)

THE Gas Committee of this Council are prepared to receive TENDERS for the supply of 11,000 Tons or thereabouts of screened GAS COAL and 200 Tons of good CANNEL for delivery during the Year ending Aug. 31, 1902, in such quantities and at such times as ordered, carriage free at the (1) Oldbury Basin G.W. Railway, and (2) L. & N.W. Railway, Oldbury.
The Coal must be of first-class quality, well screened, freshly wrought, and perfectly free from Bats, Pyrites, and other Foreign Matter.
Sealed Tenders, addressed to the Chairman of the Gas Committee, and endorsed "Tender for Coal," or "Tender for Cannel," must be delivered to the undersigned not later than Tuesday, Aug. 20 next.
The Gas Committee do not bind themselves to accept the lowest or any Tender, and reserve to themselves the right to apportion the whole quantity as they may think fit.
Tender Forms and any further Information may be obtained from the undersigned on application in writing.
By order,
A. COOKE,
General Manager.
Gas-Works, Oldbury,
July 31, 1901.

BOGNOR GASLIGHT AND COKE COMPANY, LIMITED.

REYNOLDS & CO. have been favoured with Instructions to SELL BY AUCTION, at the Royal Norfolk Hotel, Bognor, on Thursday, Aug. 29, at 3.30 p.m. precisely,

500 SHARES OF £5 EACH,
IN THE
BOGNOR GASLIGHT AND COKE COMPANY, LIMITED,

being additional Capital authorized to be raised in pursuance of the Powers of the Bognor Gas Order, 1878.
For many Years past this Company have paid the Maximum Dividend allowed by the Act of Parliament; and the Consumption of Gas is rapidly increasing, and the General Business of the Company improving.
Particulars and Conditions of Sale may be obtained of Mr. W. HAMMOND, Secretary to the Company, at the Office of the Company, Argyle Street, BOGNOR; at the ROYAL NORFOLK HOTEL, BOGNOR; and of the AUCTIONEERS, 27 and 29, High Street, BOGNOR.
By order,
WM. HAMMOND,
Secretary and Manager.

LONGWOOD GAS COMPANY.

(Incorporated by Act of Parliament, 1875).

THE Directors of the above Company give Notice that, on the 15th day of August next, they will SELL BY TENDER, 78 NEW PREFERENCE SHARES of £10 each, bearing a fixed preferential dividend of 5 per Cent., and 400 NEW ORDINARY SHARES of £10 each, limited to a Maximum Dividend of 7 per Cent.

Full Particulars and Conditions of Sale may be obtained from the undersigned, to whom Tenders must be addressed not later than the 14th day of August next.

By order of the Board,
JOHN HENRY BREARLEY,
Secretary.

TENDERS FOR GAS COAL.

THE Directors of the Slough Gas and Coke Company are prepared to receive TENDERS for the supply of 4000 Tons of good GAS COAL (screened or unscreened), to be delivered at the Great Western Railway, Slough, in the usual monthly quantities as may be required during a period of One Year from the 1st of September, 1901.

The Description of the Coal and from what Collieries raised to be stated.

Payment for Coal on or before the 20th of the following month after delivery.

Tenders, to be delivered, endorsed "Tender for Gas Coal," on or before Tuesday, the 13th prox.

The Directors do not bind themselves to accept the lowest or any Tender.

ARTHUR THOMAS,
Secretary.

Slough, Bucks,
July 27, 1901.

CRYSTAL PALACE DISTRICT GAS COMPANY.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY GENERAL MEETING of the Proprietors of this Company will be held at the Albion Tavern, Aldersgate Street, London, E.C., on Friday, the 16th day of August, 1901, at Three o'clock in the afternoon precisely, to receive the Report of the Directors and Statement of Accounts for the Half Year ended the 30th of June last, to declare a Dividend for the same period, and for General Purposes.

The TRANSFER BOOKS WILL BE CLOSED from the 2nd day of August until after the Meeting.

By order of the Board,
CHARLES M. OHREN,
Secretary.

Offices and Works:
Lower Sydenham, S.E.,
July 30, 1901.

COLNEY HATCH GAS COMPANY.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY GENERAL MEETING of the Proprietors of this Company will be held at the Company's Offices, 5, Great Winchester Street, Old Broad Street, London, E.C., on Thursday, the 22nd day of August inst., at 3.45 o'clock p.m. precisely, to receive the Report of the Directors and the Accounts of the Company for the Half Year ended the 30th of June, 1901, to declare Dividends, and for other purposes.

By order,
ERNEST L. BURTON,
Secretary.

Secretary's Offices:
5, Great Winchester Street,
London, E.C., Aug. 1, 1901.

BARNET DISTRICT GAS AND WATER COMPANY.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY GENERAL MEETING of the Proprietors of the above Company will be held at the Albion Tavern, Aldersgate Street, in the City of London, on Friday, the 23rd day of August, 1901, at Half-past Twelve o'clock in the Afternoon precisely, to receive the Report of the Directors and the Accounts for the Half Year ended the 30th day of June last, to declare a Dividend, and to transact the General Business of the Company.

The TRANSFER BOOKS WILL BE CLOSED from the 10th to the 23rd of August, both inclusive.

By order of the Board,
ERNEST W. DREW,
Secretary.

Offices: 30, Gracechurch Street,
London, Aug. 2, 1901.

RIDDINGS DISTRICT GAS COMPANY.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY MEETING of the Shareholders of the above Company will be held at the Offices of the Company, No. 30, Gracechurch Street, in the City of London, on Friday, the 23rd day of August, 1901, at Three o'clock in the Afternoon precisely, to receive the Report of the Directors and the Accounts for the Half Year ended the 30th day of June last, to declare a Dividend, and to transact the General Business of the Company.

The TRANSFER BOOKS WILL BE CLOSED from the 10th to the 23rd of August, both inclusive.

By order of the Board,
ERNEST W. DREW,
Secretary.

Offices: 30, Gracechurch Street,
London, Aug. 2, 1901.

THOMAS DUXBURY & CO.,
16, DEANSGATE, MANCHESTER.

Best Gas Coal and Cannel, giving High Illuminating Power, Large Yield per ton, and reasonable in Price.

Telegrams: "DARWINIAN, MANCHESTER."
Telephone 1806.

TOTTENHAM AND EDMONTON GASLIGHT AND COKE COMPANY.

NOTICE is Hereby Given, that the ANNUAL ORDINARY GENERAL MEETING of the Proprietors of this Company will be held at the Company's Chief Office, 639, HIGH ROAD, TOTTENHAM, on Saturday, the 24th day of August next, at Three o'clock in the afternoon precisely, to receive the Report of the Directors, and Statement of Accounts for the Half Year ended the 30th of June, 1901, to declare a Dividend for the same period, and for the election of Two Directors and an Auditor for the ensuing Year, also for the transaction of General Business.

The TRANSFER BOOKS WILL BE CLOSED for the CONSOLIDATED STOCKS from the 10th to the 26th day of August, both days inclusive.

By order of the Board,
JAMES RANDALL,
Secretary.

Offices: Willoughby Lane,
Tottenham, Aug. 2, 1901.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his AUCTIONS of STOCKS and SHARES in London, Suburban, and Provincial Gas and Water Companies are held PERIODICALLY, at the Mart, Tokenhouse Yard, E.C.

He also undertakes the issuing by AUCTION of GAS and WATER STOCKS and SHARES under Parliamentary Powers.

Terms for issuing such Capital, and also for including Gas and Water Stocks and Shares in these periodical Sales, can be obtained on application at Mr. ALFRED RICHARDS' Offices, 18, Finsbury Circus, E.C.

Net Price: Cloth Bound, 12s. 6d.; *Morocco Gilt*, 18s.

GAS COMPANIES'
BOOK-KEEPING.

A Practical Treatise on the Keeping of Gas Companies' Accounts.

By
JOHN HENRY BREARLEY & BENJAMIN TAYLOR,
OF LONGWOOD.

It is the fruit of 33 years of practical and professional experience. It is very painstaking and complete. A large portion of the matter is adaptable to the book-keeping of Local Authorities. A thoroughly practical and excellent work.—*Glasgow Herald.*

Unlike most of the recent works on book-keeping, this volume is a valuable addition to the literature of the subject. Of text-books on book-keeping in general we have more than sufficient; but we heartily welcome the appearance of such books as this which deal exhaustively with the accounts of some particular industry. The authors deal with the subject in an exceedingly practical way, giving not only specimens of the books and forms required, but also a model set of transactions which should enable the student to obtain a thorough insight into the subject. — *The Accountant's Magazine.*

London:
WALTER KING, 11, Bolt Court, Fleet Street, E.C.

ROBERT MARSHALL,
CANNEL COAL MERCHANT,
97, WELLINGTON STREET, GLASGOW.

Prices and Analysis of all the Scotch Cannels on Application.

NEWBATTLE CANNEL.

Highest Results in Gas, & Excellent Coke.

QUOTATIONS ON APPLICATION TO
THE LOTHIAN COAL COMPANY,
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ESTABLISHED 1820.

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MADE from Spent Oxide (free from Arsenic) and of excellent Purity. Specially prepared for Sulphate of Ammonia Manufacturers.

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PATENT
CANDLE SAFETY LAMPS

Are a great improvement on Oil, giving a good Light, requiring little or no Cleaning, and when once lighted no further attention is necessary. The Candles are made to burn 5, 7, or 9 hours.

48, Manchester Street, Gray's Inn Road, W.C.

UNEQUALLED.

Gas Companies are solicited to try Samples of the

MIRFIELD
BLACK BED GAS COAL.

Prices and Analysis on application.

MIRFIELD (GAS-COAL) COLLIERY COMPY.
RAVENSTHORPE, NEAR DEWSBURY.

JAMES OAKES & CO.

ALFRETON IRON-WORKS, DERBYSHIRE,
AND
Wenlock Iron Wharf, 21 & 22, Wharf Road, CITY ROAD, LONDON, N.,

Manufacture and keep in Stock at their Works (also large stock in London)

PIPES and CONNECTIONS, 1¼ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

Note.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with Bolts, Nuts and Covers, and rendering Leakage impossible.

Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887, for
CANNEL & COAL.

TYNE
BOGHEAD CANNEL.

Yield of Gas per ton	13,155 cub. ft.
Illuminating Power	38·22 candles.
Coke per ton	1,301·88 lbs.

EAST PONTOP GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	17·8 candles.
Coke	70 per cent.

SOUTH PELAW MAIN GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·3 candles.
Coke	73·1 per cent.

For Prices and complete Analysis, apply to
THOS. W. DANCE, SON, & HUNTER,
Coal Owners, Newcastle-on-Tyne
or
E. FOSTER & CO.,
21, John Street, Adelphi, London, W.C.

THE DELLWIK-FLEISCHER WATER-GAS PROCESS

For Increasing the Capacity of Coal-Gas Works, also for Incandescent Lighting, Driving of Gas-Engines, and Manufacturing Purposes.

(PATENTS IN ALL COUNTRIES)

Plants contracted for within the last Eighteen Months for the following Gas-Works: WEST BROMWICH, KÖNIGSBERG, ISERLOHN, LYONS, ERFURT, REMSCHEID, PFORTSHEIM, PLAUEN, BARMEN-RITTERSHAUSEN, NUREMBERG, BRUMMEN,* OSTERFELD,* WARSTEIN,* WIBORG.*

[* Blue Water Gas with Incandescent Burners.]

ALSO TWENTY-SEVEN INSTALLATIONS FOR MANUFACTURING PURPOSES.

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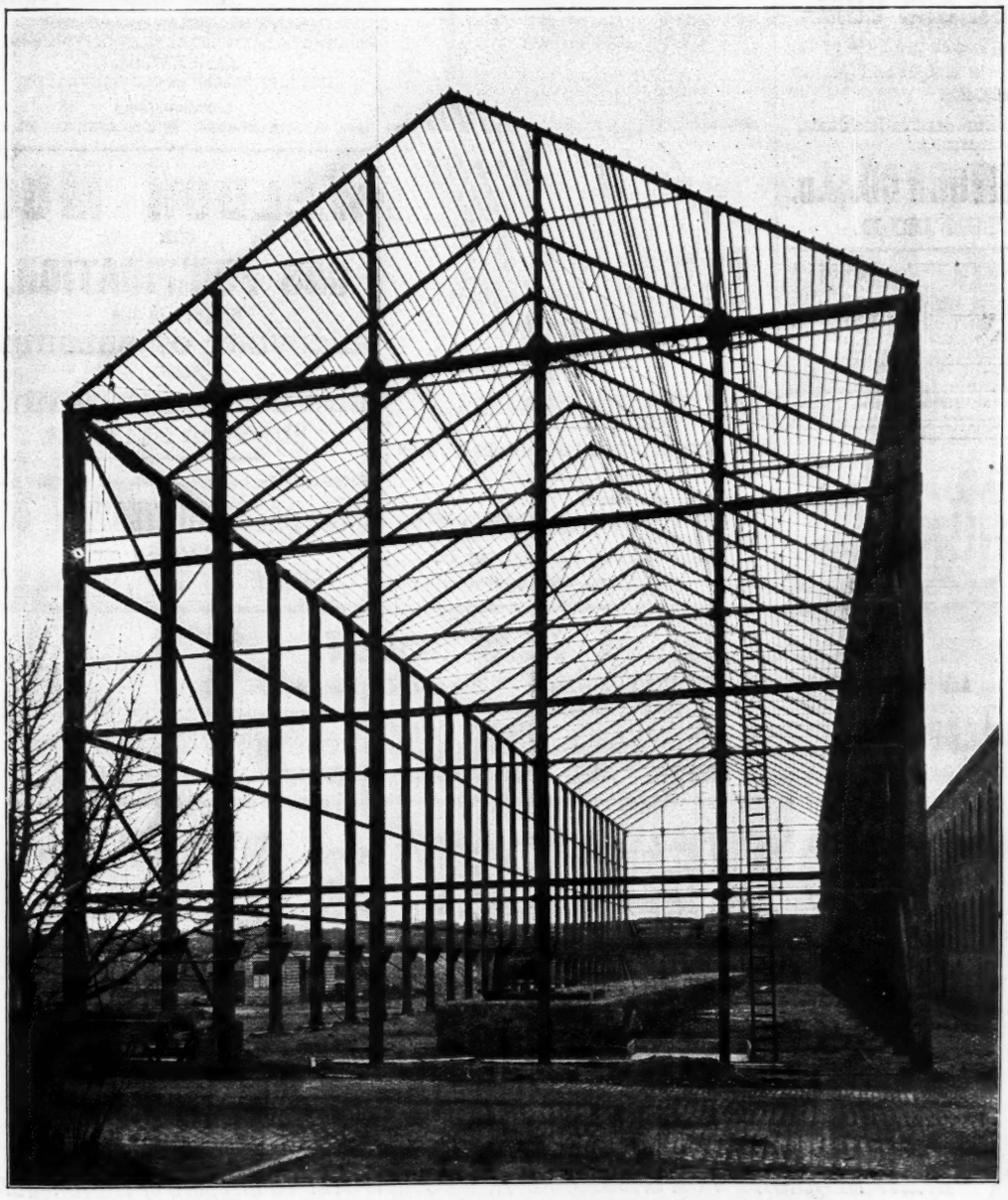

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Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.
Special Lumps, Tiles, and Bricks for Regenerative and Furnace Work.
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HEATHCOTE GAS COAL.
Rich in Illuminating Power and Yield of Gas.
Above the Average in Weight and Quality of Coke.
Maintains a High Standard in Residuals.

THE GRASSMOOR CO., LD.,
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CRESSWELLS' ASBESTOS CO., LTD.
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Asbestos Spinners and Manufacturers.
Telephone No. 950. Tels.: "Asbestos, Bradford."

Do you fancy . . .
ZINCATE OF SODA
as a Boiler Disincrustant?
CONSULT US BY PENNY POST.
Ask for No. 3 Catalogue.
Applications for Colonial and Foreign Agencies desired.

NITRATE of Thorium and Cerium.
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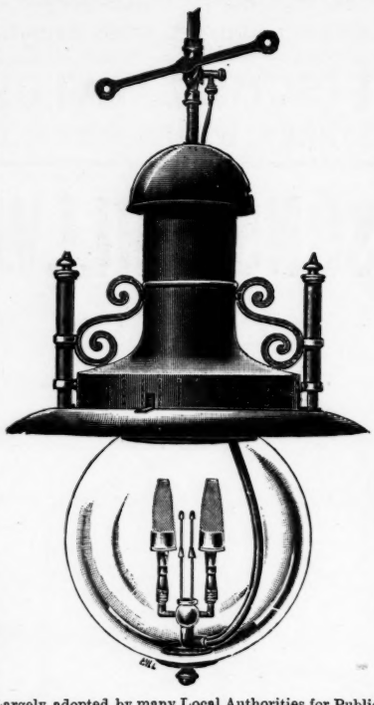
THE PATENT
"BEACON" GLOBE LAMP.



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Late of Cannon Street,
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MANUFACTURERS OF
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FOR
GAS PURIFICATION,
For use in the
RECOVERY OF SULPHUR,
ALSO
Removal of last Traces of SULPHURETTED HYDROGEN in catch position.
Full Particulars on application to the Patentees
GAS DESULPHURIZATION CO.,
— *LIMITED,* —
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STOURBRIDGE, ENGLAND.
MANUFACTURERS OF
FIRE-CLAY GAS-RETORTS, FIRE-BRICKS, LUMPS, & TILES of Every Description.
GLAZED BRICKS AND PORCELAIN BATHS.

MOBBERLEY & PERRY
STOURBRIDGE.
Manufacture & supply best quality of
Gas Retorts (SEGMENTAL, HORIZONTAL, or INCLINED.)
Special Bricks & Blocks for GENERATOR & REGENERATOR FURNACES.
FIRE BRICKS, LUMPS, & TILES, BLUE STAFFORDSHIRE VITRIFIED BRICKS FOR PAVING, &c., &c.
EVERY REQUISITE FOR GAS-WORKS. Retort Setters sent to any part of the Kingdom.
London Agents: Contractors for the erection of Retort-Benches complete.
BALE & HARDY, Gas Engineers and Contractors,
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SCOTT-SNELL
SELF-INTENSIFYING LAMP.

Automatic Action.

No Complex Mechanism.

"Power" Free of Cost.

TYPE OF SCOTT-SNELL LAMPS
NOW IN USE
AT THE GLASGOW EXHIBITION.

INTENSIFIED LIGHT

WITHOUT Compressing Plant, Special Gas-Service, Water Bill, Gas-Engine or other Pumping Appliances, tearing up of Roadways, or interference with existing Service.

The **SCOTT-SNELL LAMP** may be set to give any pressure from **4 inches to 36 inches of Water; 8 inches to 10 inches is usually preferred.**

Lanterns supplied with Single, Duplex, or Cluster of Burners.

TO GAS ENGINEERS AND MANAGERS.

At the Stand on the North Bank of the Kelvin, an attendant will be pleased to give full explanation, and to show the action of the Lamp.

This unique Illustration of Wasted Bye-Products (heat in escaping products of combustion) effecting, without cost, all that is elsewhere reached by special motive power and special distributing Mains, should not be missed,

350 to 500 Candles from a Single Burner, with an efficiency of 35 Candles per cubic foot of Gas.

The ONLY High-Pressure Lamp.

THE LAMPS MAY BE INSPECTED AT ANY TIME BY APPOINTMENT.

THE SCOTT-SNELL SELF-INTENSIFYING GAS-LAMP COMPANY, LTD.,

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JOSEPH EVANS & SONS. CULWELL WORKS, WOLVERHAMPTON.

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12,000 PUMPS IN STOCK AND PROGRESS.

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NO TAPPETS.

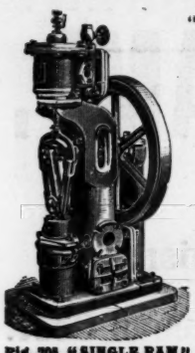


Fig. 705. "SINGLE RAM" STEAM-PUMP.

Fig. 806. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

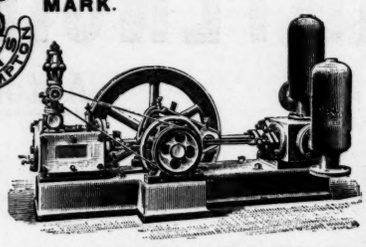


Fig. 685. "RELIABLE" STEAM-PUMP FOR TAR AND THICK FLUIDS.

Fig. 712. "DOUBLE-RAM" STEAM-PUMP.

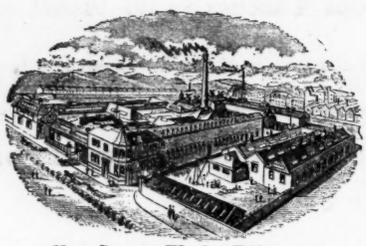
Established 1850.

ALDER & MACKAY.

MANUFACTURERS OF

WET AND DRY GAS-METERS

Combining all the Latest Improvements.



New Grange Works, Edinburgh.

DRY METERS.

DRY METERS IN BEST TINNED-PLATE CASES.

DRY METERS IN CAST-IRON CASES.
(We are the Original Designers and Makers of Cast-Iron Dry Meters.)

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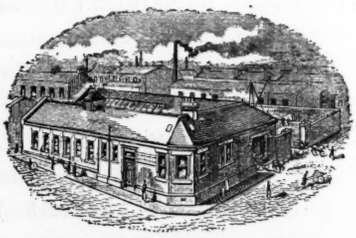

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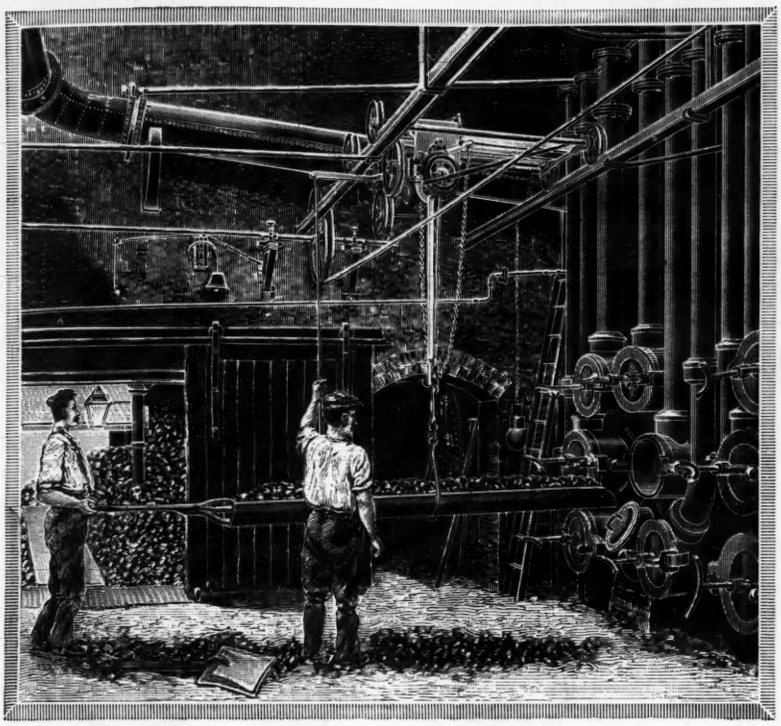

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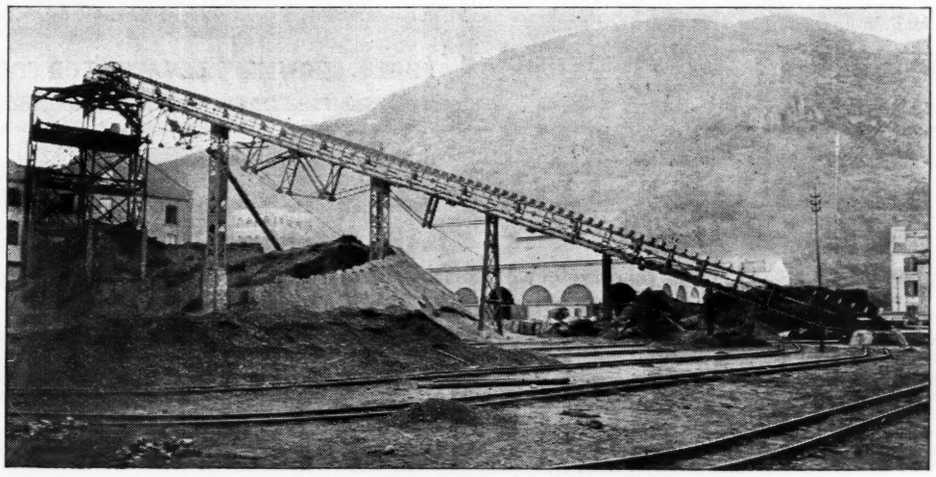

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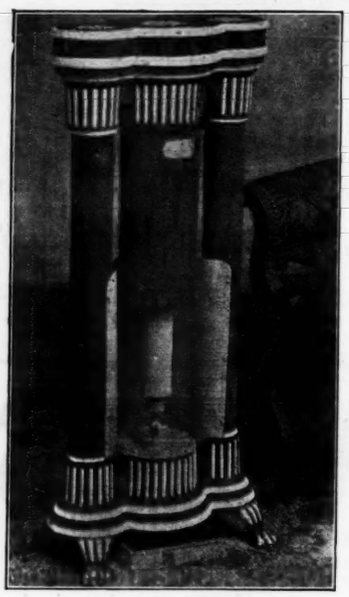

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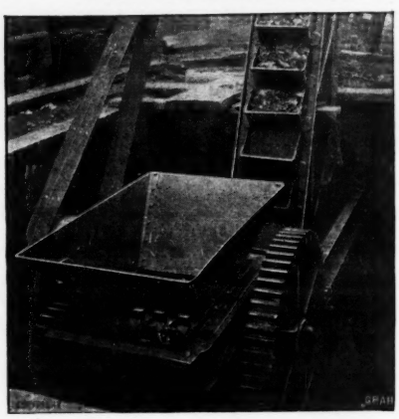

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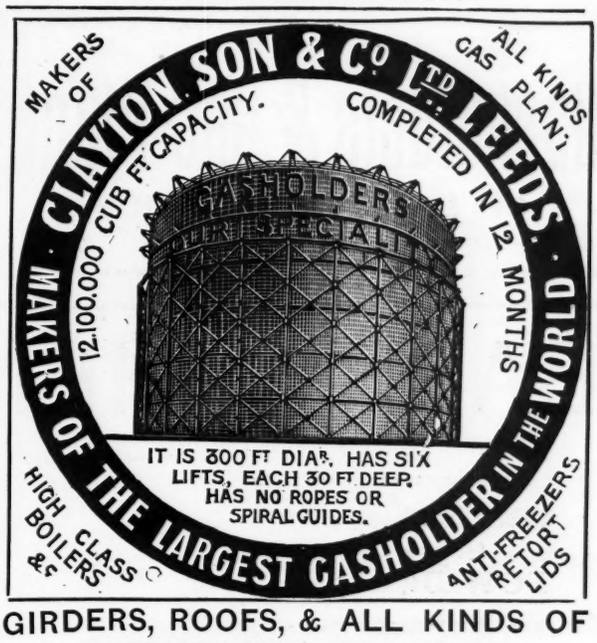
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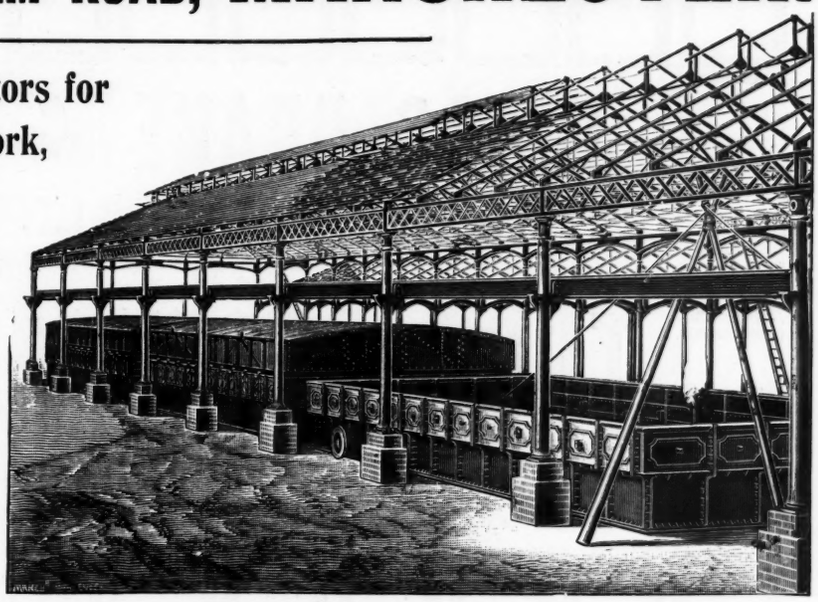

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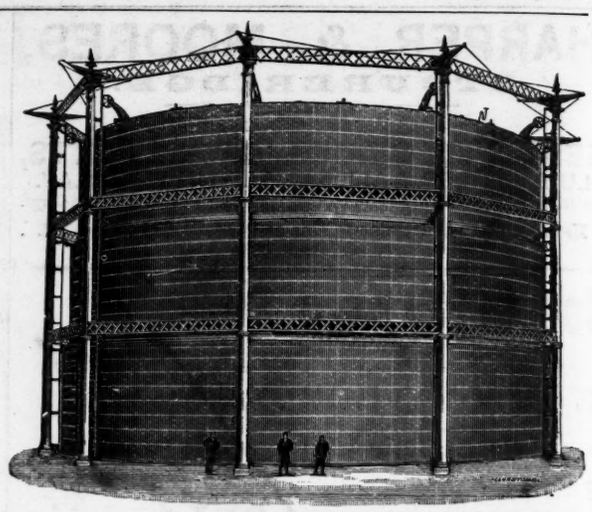

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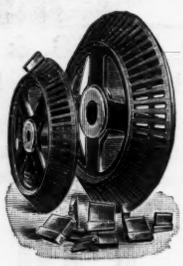

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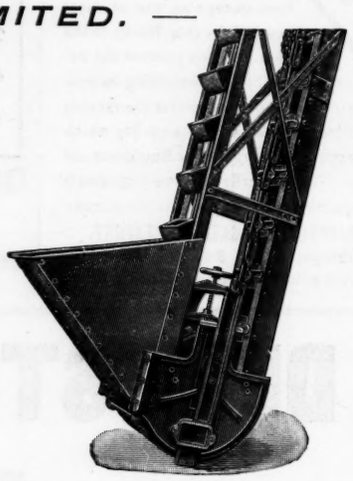

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